

Mobile phone use by drivers, 2000-03

**Prepared for Road Safety Strategy Division, Department
for Transport**

J Broughton and J P Hill

First Published 2005
ISSN 0968-4107
ISBN 1-84608-633-7
Copyright TRL Limited 2005.

This report has been produced by TRL Limited, under/as part of a contract placed by the Department for Transport. Any views expressed in it are not necessarily those of the Department.

TRL is committed to optimising energy efficiency, reducing waste and promoting recycling and re-use. In support of these environmental goals, this report has been printed on recycled paper, comprising 100% post-consumer waste, manufactured using a TCF (totally chlorine free) process.

CONTENTS

	Page
Executive Summary	1
1 Introduction	3
2 Seat Belt Survey	3
2.1 Results	4
2.2 Mobile phones and seatbelts	5
3 Mobile Phone Survey	5
3.1 Methodology	6
3.2 Detection of phones	7
3.3 Results	7
3.3.1 <i>Hand-held phones, car drivers</i>	8
3.3.2 <i>Hand-held phones, drivers of other vehicles</i>	8
3.3.3 <i>Hands-free phones, car drivers</i>	8
3.3.4 <i>Hands-free phones, other drivers</i>	9
3.4 Saturdays	9
3.5 Summary	9
4 Conclusions	10
5 Acknowledgements	10
6 References	10
Appendix A: List of survey sites	11
Appendix B: Phone users and non-users	13
Appendix C: Summary of mobile phone regulation	14
Appendix D: Technical details	15
Abstract	16
Related publications	16

Executive Summary

The ownership and use of mobile phones grew rapidly in the United Kingdom from early 1990s, until by 2003 73% of adults owned or used a mobile telephone. Many owners were willing to use their phones whilst driving, in spite of growing concerns about the implications for road safety and high-profile court cases arising from road accidents which were allegedly caused by the use of a mobile phone. Research had suggested that these concerns are well founded. A regulation took effect in December 2003 to prohibit the use of hand-held mobile phones by the drivers of motor vehicles in Great Britain.

Thus, evidence about the use made of mobile phones is important to monitor the current exposure to risk and, in future, to monitor compliance with the 2003 regulation. This Report describes two sets of surveys that have been carried out by TRL on behalf of the Department for Transport that produce complementary evidence about the use made of mobile phones:

- The Seat Belt Survey has been carried out regularly for many years, observing seat belt use in stationary traffic mainly at junctions controlled by traffic signals. In October 2000 the survey was expanded to observe the use of mobile phones. Seven surveys were carried out between October 2000 and October 2003 in extensive study areas centred on Crowthorne and Nottingham, and a further six surveys were carried out in additional areas of England.
- The Mobile Phone Survey uses an electronic detector to warn a human observer that a mobile phone is being used in the vicinity. This allows drivers' use of mobile phones to be observed in freely flowing traffic, although drivers' personal details such as age and sex cannot be observed. Following preliminary trials, full scale surveys were carried out in October 2002 and September 2003 in an extensive study area in the South East of England.

The first Seat Belt Survey to record mobile phone use in October 2000 observed that 1.1% of drivers in the Nottingham study area and 1.6% of drivers in the Crowthorne study area were using mobile phones. These figures rose to 1.8% and 2.7% respectively by April 2002, and stayed around these levels in the subsequent surveys.

The Seat Belt Survey records personal details of drivers, unlike the Mobile Phone Survey. Analysis of these details shows that the level of phone use falls with age, being very low among drivers at least 60 years old. It is slightly higher among men than among women. Another result from the Seat Belt Survey is that car drivers who were using mobile phones were more than twice as likely as non-users to be driving while not wearing a seat belt, and a similar difference was found among van drivers. This may indicate that using a mobile phone and driving whilst unbelted are manifestations of a person's general willingness to take risks while driving, or indifference to or ignorance of these risks.

Comparison of the results from the Seat Belt and Mobile Phone Surveys in the Crowthorne area suggests that the Seat Belt Survey has recorded the use of hand-held phones reliably in this area, but has observed only about one third

of the use of hands-free phones. This demonstrates the value of the electronic detector in assisting human observers. This ability to observe the use of hands-free phones reliably will be crucial in future since, if the regulation which came into force on 1 December 2003 proves effective, the mobile phones used by drivers will become predominantly hands-free.

Almost 110,000 cars and over 27,000 other vehicles were observed in the September 2003 Mobile Phone Survey. The observations were weighted by traffic flow to estimate the proportion of drivers who were using mobile phones. The main results relate to phone use on weekdays, and may be summarised as follows.

Proportion of drivers using mobile phones, weekdays, September 2003

Type of phone	Car drivers	Other drivers
Hand-held	1.6%	2.7%
Hands-free	1.7%	1.7%
Overall	3.3%	4.4%

Comparison with the results of the survey in October 2002 shows that the level of use of hand-held phones fell by about one fifth over the intervening year (highly significant statistically). This may be a consequence of increased awareness of the dangers of mobile phone use following publicity in advance of the regulation which took effect in December 2003, with some drivers switching to hands-free kits which are not generally covered by the new legislation. The level of hands-free phone use had risen marginally, and by September 2003 slightly more car drivers were using hands-free phones than hand-held phones.

The Seat Belt and Mobile Phone Surveys have both shown that car drivers use mobile phones on Saturdays at about half the level found on weekdays. Only the Seat Belt Survey makes observations on Sundays, and its results have shown that the level on Sundays is slightly lower than on Saturdays (the evidence from the Seat Belt Survey led to the decision to exclude Sundays in the Mobile Phone Survey).

The Seat Belt Survey has a much wider geographical coverage than the Mobile Phone Survey, which has been carried out in a single study area in South East England. The Seat Belt Survey has found clear differences between its survey areas in the level of phone use, so it will be important in future to extend the Mobile Phone Survey to other areas in order to build up a picture of phone use across England.

A further Mobile Phone Survey was carried out in April 2004, and the results have been reported by Hill (2005). It examines the effects of the 2003 mobile phone regulation on drivers' use of mobile phones.

Reference

Hill J P (2005) *A survey of mobile phone use by drivers, April 2004*. TRL Report TRL635. Crowthorne: TRL Limited

1 Introduction

The ownership and use of mobile phones grew rapidly in the United Kingdom from early 1990s, until by 2003 73% of adults owned or used a mobile telephone (Ofcom, 2003). Many owners were willing to use their phones whilst driving, in spite of growing concerns about the implications for road safety and high-profile court cases arising from road accidents which were alleged to have been caused by use of mobile phones. Research had suggested that these concerns are well founded; for example, TRL research found that driving while using a mobile phone was as hazardous as drink-driving (Burns *et al.*, 2002). Legislation took effect in December 2003 in Great Britain to prohibit the use of hand-held mobile phones by the drivers of motor vehicles.

Thus, evidence about the use made of mobile phones is important to monitor the current exposure to risk and, in future, to monitor compliance with the 2003 legislation. This Report describes two sets of surveys that have been carried out by TRL on behalf of the Department for Transport that produce complementary evidence about the use made of mobile phones:

- The Seat Belt Survey has been carried out regularly for many years, mainly at junctions controlled by traffic signals, and in October 2000 the survey was expanded to observe the use of mobile phones.
- The Mobile Phone Survey which began in October 2002 is more advanced technologically than the Seat Belt Survey, so that drivers' use of mobile phones can be observed in freely flowing traffic.

Section 2 presents analyses of the data collected by the Seat Belt Survey about the use of mobile phones. Section 3 describes the Mobile Phone Survey and presents results from the two surveys that have been carried out. Section 4 presents the conclusions that can be drawn.

2 Seat Belt Survey

For over a decade TRL has carried out a regular series of surveys on behalf of the Department for Transport (Broughton, 1990 and 2003). In April and October, the use by car occupants of seat belts and other restraint systems is observed at 32 sites in two extensive study areas centred on Crowthorne and Nottingham. The Survey was extended in 1998; additional surveys are carried out each summer in new areas to examine variations in restraint use across England. Sites are chosen to represent all types of road except motorways (it is impossible to find suitable survey sites on motorways). A list of the survey sites is given in Appendix A. In addition to weekday observations at all sites, observations are made at the weekend at eight sites. Results have been published in an annual series of leaflets.

Each of the recent surveys has observed the restraint use of the occupants of at least 28 thousand cars and 3 thousand vans. For example, the October 2003 survey observed 29,550 cars and their drivers, together with 9,464 front seat passengers and 4,867 rear seat passengers. The age and sex of each of these car occupants were recorded, together

their restraint use. The survey also recorded these details for 3,453 van drivers and 966 van passengers.

The survey sites are mainly located at junctions controlled by traffic signals, as it is important to observe only stationary or slow moving vehicles in order to monitor rear seat passengers accurately. Under these conditions it possible to see clearly whether a car driver is using a hand-held mobile phone, and even some types of hands-free set, so in October 2000 the survey was expanded to include observations of mobile phone use. The level of use of mobile phones at junctions may differ from the level in other parts of the road network, and may be underestimated if some types of hands-free phone cannot be observed, but the results should give useful insights into the national trend for mobile phone use.

The survey records detailed observations about each occupant of as many stationary cars as possible, and the data are recorded on a handheld computer. In order to record the use of a mobile phone, the computer program was amended to record this extra item for the driver. The data could then be analysed as part of the general data processing. The seat belt results are weighted to take account of the sampling fraction at each site, and the same is done for the mobile phone results.

The survey was designed to identify trends in seat belt wearing by monitoring the two survey areas closely, so that if the wearing rate was observed to change then there could be confidence that an actual change had occurred and that the difference had not arisen by chance. While this focus on two areas has been effective, it has not provided information about the situation in other parts of England. The survey was extended in 1998 to collect information from other areas in order to gradually build up a broader picture of seat belt wearing across the country. Observations have been made in two additional areas each summer, using the same technique and staff as the main survey. Consequently, when the main survey was expanded to observe mobile phone use, this was also done in the summer survey areas. In addition to results for the Crowthorne and Nottingham survey areas, results will be presented for the following summer survey areas:

2001	Around Gloucester	Around Harrogate
2002	Kent	East Yorkshire
2003	North London	North East Birmingham

These results from 8 survey areas provide preliminary indications of the variability of drivers' mobile phone use around the country. When considering the results, however, it is important to remember the following caveats:

- While the use of hand-held mobile phones should be recorded reliably, the same is not true of some types of hands-free set, so the results will underestimate the overall use of mobile phones. The regulation that took effect in December 2003 is likely to increase the use of hands-free phones at the expense of hand-held phones, so this will be more of a limitation from 2004 onwards.
- The level of use of mobile phones at junctions may differ from the level in other parts of the road network,

so the results may not be representative of the level of use across the network.

The recognition of these limitations led to the development of the more technically advanced Mobile Phone Survey.

2.1 Results

A range of seatbelt-related results from recent surveys has already been published, together with an account of the methodology and the numbers of vehicles observed (Broughton, 2003). The principal result relating to the use of mobile phones is the proportion of drivers observed using a phone; the overall results will be presented first, followed by various more detailed results.

Figure 2.1 presents the overall proportions for car drivers and van drivers. There is one point per survey in each graphic. Each point is positioned according to the date of the survey, so the earliest results appear to the left and the latest to the right. The points for the Crowthorne and Nottingham surveys are linked to highlight the changes in these survey areas (the points represent the actual results, no attempt has been made to model the trends). The points for the summer surveys can then be related to these lines to assess the local level relative the trend.

Each point shows the overall proportion found in that survey, but this is an estimate calculated from a sample of the traffic that passed the survey points. The standard error of the estimate is about 0.12% for car drivers, so the 95% confidence interval for the points is $\pm 0.24\%$. Fewer vans than cars are observed, so the standard error for van drivers is about 0.4% and the 95% confidence interval is $\pm 0.8\%$.

The overall level of phone use among car drivers rose in the Crowthorne and Nottingham areas until October 2002, but remained at that level in October 2003. There have been significant variations between survey areas, with the level being consistently highest in the Crowthorne area; however, a similar level was found in North London in the summer of 2003. The figure includes results from the survey conducted in April 2004, after the mobile phone regulation came into force in December 2003.

In each survey, the level of phone use has been found to be higher among van drivers than among car drivers. Significant variations have been found between survey areas, broadly matching the variations found with car drivers. The highest level of use, however, was found in North London in 2003, where almost 6% of van drivers were using a phone.

Table 2.1 presents details of the level of phone use by type of phone, age and sex of driver. Data from the three

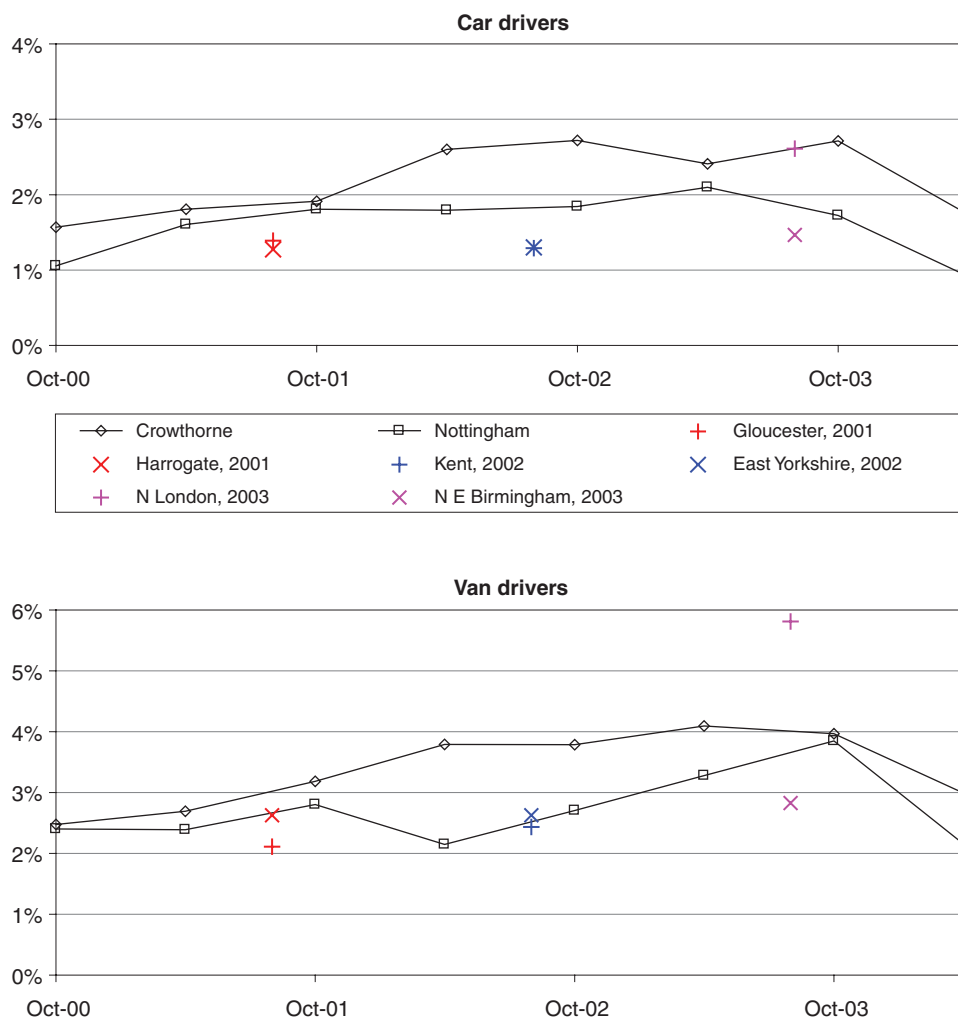


Figure 2.1 Proportion of drivers observed using a phone

Table 2.1 Details of level of phone use, October 2002-October 2003

		<i>Car drivers</i>		<i>Van drivers</i>	
		<i>Crowthorne</i>	<i>Nottingham</i>	<i>Crowthorne</i>	<i>Nottingham</i>
Total		2.5%	1.8%	3.8%	3.2%
Hand-held		2.0%	1.4%	3.6%	2.9%
Hands-free		0.6%	0.4%	0.2%	0.3%
Age range	17-29	3.9%	2.7%	4.5%	5.2%
	30-59	2.8%	1.9%	4.1%	3.1%
	60-99	0.7%	0.2%	0.5%	0.2%
Men		2.7%	1.9%		
Women		2.4%	1.7%		
Built-Up roads		3.0%	1.5%	4.0%	2.8%
Non Built-Up roads		2.4%	2.3%	3.8%	3.8%

Built-Up roads have speed limit ≤ 40 mph, Non Built-Up roads have higher limits

surveys conducted between October 2002 and October 2003 are combined to increase the precision of the estimates. All of the differences for car drivers are significant, except for the difference between men and women in the Crowthorne area which almost achieves significance ($p=0.065$). All of the differences for van drivers are significant (results are not presented for men and women because of the small number of observations of women van drivers).

These results suggest that the level of phone use declines with increasing age, being especially low among drivers at least 60 years old; it is slightly higher among men than among women. This is probably influenced by the ownership of mobile phones in the driving population. The great majority of phones observed were hand-held although this may be the result of the greater difficulty of observing hands-free phones that was mentioned previously. The agreement between the pattern of these results in the two survey areas and their statistical significance suggests that these differences are real. On the other hand, the differences between Built-Up and Non Built-Up roads are statistically significant but not consistent between the two survey areas, so no conclusion can be drawn in this respect.

All sites are surveyed on a weekday, and 4 are resurveyed on a Saturday and 4 on a Sunday. This provides information about the level of phone use at the weekend relative to the level during the week. Table 2.2 compares the level of use at the 4 Saturday sites with the level found at the same sites on a weekday, and similarly

Table 2.2 Level of phone use, weekdays and weekend, October 2002-October 2003

		<i>Car drivers</i>			<i>Van drivers</i>		
		<i>Weekend</i>			<i>Weekend</i>		
	<i>Weekend</i>	<i>Weekend</i>	<i>Weekday</i>	<i>Weekend</i>	<i>Weekend</i>	<i>Weekday</i>	
Saturday sites	1.3%	2.5%	0.54	2.2%	4.4%	0.50	
Sunday sites	1.1%	2.6%	0.41	1.9%	4.5%	0.43	

for the 4 Sunday sites; data from three surveys are again combined for increased precision. The level found on Saturday was about half the level found during the week, and the level found on Sunday was lower still.

2.2 Mobile phones and seatbelts

The previous section considered the use of mobile phones in isolation, but the Seat Belt Survey's simultaneous observation of seatbelt and mobile phone use means that the use of mobile phones can be related to the wearing of seatbelts. Table 2.3 presents results from April 2003, and a very similar pattern is found with the other surveys: users of mobile phones are far less likely than non-users to wear a seatbelt.

Table 2.3 Wearing rate of phone users and non-users, April 2003

		<i>Wearing rate of:</i>	
		<i>Car drivers</i>	<i>Van drivers</i>
Driver not using phone		91.2%	63%
Driver using phone		80.2%	49%

These results actually underestimate the difference between phone users and non-users. The Survey is only able to record drivers' behaviour as they pass the survey point, so some drivers who were not observed using a phone may have just finished making a call, or may have begun a call shortly afterwards. This is discussed in Appendix B, which shows that the difference between the wearing rate of drivers who sometimes use their phones ('users') and drivers who never use a phone ('non-users') is greater than the table suggests. There is no reliable evidence about the proportion of driving time that users spend using a phone, but suppose for example that it amounts to 10% on average. The Appendix shows that this assumption implies that the wearing rate of non-users would have been 94.0%, compared with 80.2% for users. The effect is even larger for van drivers; the same assumption implies that the wearing rate of non-users was 71%.

Other assumptions about the proportion of a driver's time spent using a phone yield alternative numerical results, but all imply that the wearing rate of non-users in April 2003 was above the level shown in Table 2.3.

3 Mobile Phone Survey

As mentioned in the previous section, the ideal survey methodology would allow the use of mobile phones to be observed at any roadside location, not simply where traffic is stationary or slow moving. It would also allow all types of mobile phones to be observed with equal facility. Consequently, in 2001 the feasibility of using an electronic detector to assist the human observer was investigated.

Suitable equipment was found to be available commercially. Legal advice was sought; this confirmed that the planned survey was entirely legal since the detector could only register the presence of a phone call.

Roadside trials were conducted, and these demonstrated that the detector could assist human observers to observe phone use reliably. It was found, however, that factors such as the location of mobile phone masts and the design of overbridges still restricted the choice of survey site, so practical limitations remain.

The first survey was carried out in October 2002 and a second in September 2003. The following sections focus on the latter survey, with supplementary information about the former survey.

At the time when the first survey was being planned, the Seat Belt Survey had already provided evidence that the level of mobile phone use could vary geographically. It was decided to carry out the first surveys in a single extensive survey area to develop a robust methodology and establish a baseline for future monitoring. It is hoped to extend the Mobile Phone Survey in future to cover other areas of the country.

3.1 Methodology

The Mobile Phone Survey was conducted at 39 sites in South East England, as listed in Appendix A and illustrated in Figure 3.1. The sites were distributed over an area of approximately 1,000 square miles and were chosen to represent the full range of conditions on British roads. They included motorways, dual carriageways and single carriageway roads and were located in towns, villages and on country roads. The single carriageway roads included A, B, C and Unclassified roads. The speed limits varied from 20mph to 70mph. Most of the sites had been used in

the previous survey, but some had been changed in order to produce a more representative sample of roads.

At least two observers were present at every site for Health and Safety reasons. This meant that other vehicles could be counted separately from cars at all sites; additional observers were used at motorway sites to record vehicles in all lanes. The observers were either full-time members of TRL staff or members of the TRL team of interviewers. All staff were given training before they conducted a survey, including the use of the electronic detector and guidance on the identification of drivers who were using mobile phones. Staff were provided with high-visibility jackets and given a safety briefing before going on site.

All 39 sites were surveyed on a weekday. Eight were also surveyed on a Saturday, but no observations were made on Sundays. Most surveys were carried out between 8.00 a.m. and 5.00 p.m. 'Full-day' surveys were carried out at eight sites, consisting of eight half-hour observation periods spanning both the morning and afternoon. The remaining sites were surveyed for four half-hour periods. At a few sites only three periods were possible due to problems outside the control of the observers.

The primary objective of the survey was to estimate the level of use of hand-held mobile phones by car drivers. However, the second observer counted the drivers of lorries, vans and buses. The decision on whether a particular vehicle should be classified as a car or other was ultimately left to the observers. The guidance was that in ambiguous cases (usually vans based on a car body) a vehicle with conventional seating behind the driver should

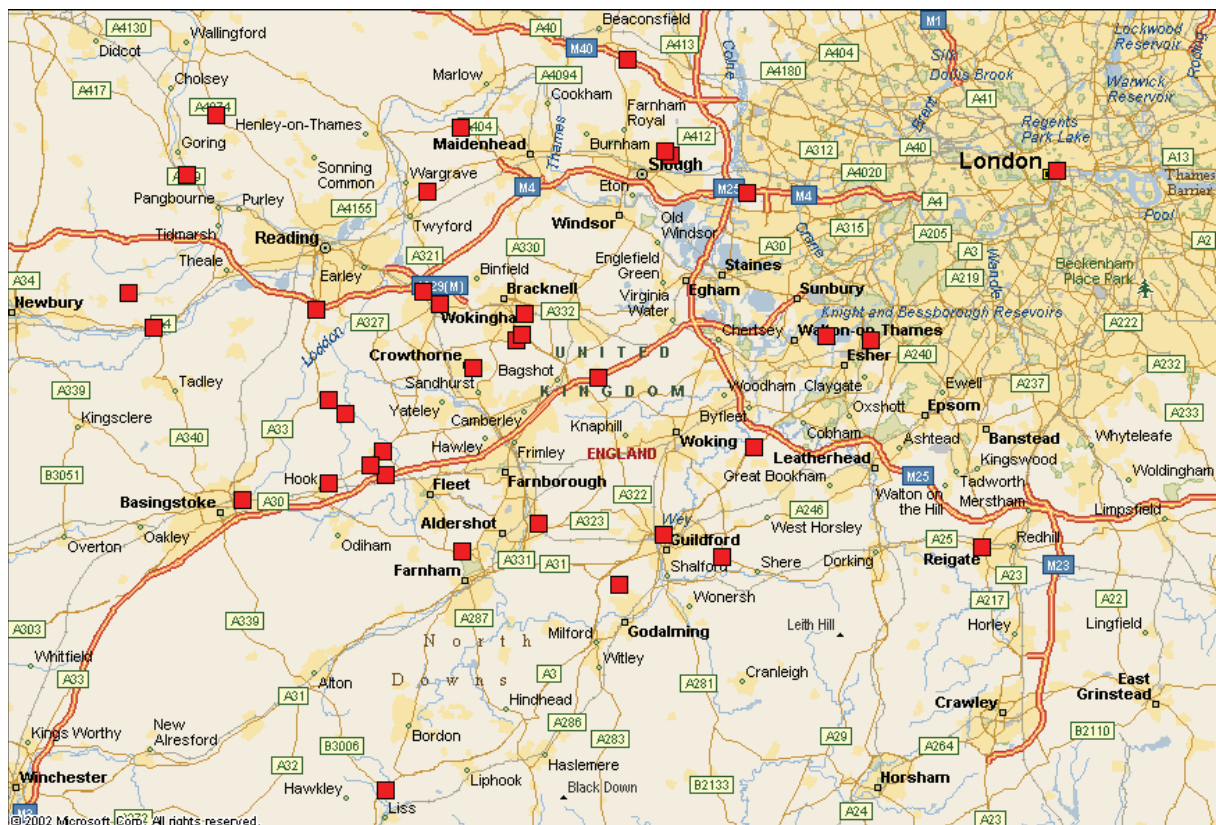


Figure 3.1 Survey locations

be classified as a car. Agricultural and emergency vehicles were included in the survey, but motorbikes were not.

To avoid confusion, any vehicle that travelled past a count point several times during the survey was counted each time. This applied mainly to buses on local routes and delivery drivers. Vehicles travelling in both directions were included in the survey at single carriageway sites but on dual carriageways and motorways it was only possible to count vehicles going in one direction.

The method of data collection is much simpler and more rapid than for the Seat Belt Survey, and uses one bank of three counters for cars and another for other vehicles. The first counter is pressed whenever a vehicle is observed; if the driver is using a hand-held mobile phone then the second counter is pressed, while the third is pressed if a hands-free phone is in use. The counts are entered on a survey form at the end of each session.

3.2 Detection of phones

On single carriageway roads the survey was usually conducted from a lay-by or verge. On motorways and most dual carriageways the survey was conducted from an overbridge.

A phone was classified as hand-held if the driver was seen to be using a hand to hold the phone. This included drivers dialling numbers, reading or writing text messages or just holding phones. Drivers balancing a phone on their shoulder or holding an earpiece were also considered to be using a hand-held mobile phone. Drivers who were using an earpiece but who may have dialled while holding the phone were counted as using a hands-free phone.

The legislation regulating the use of hand-held phones which took effect on 1 December 2003 had not been published when the survey was carried out. The distinction between the types of phone applied by the survey staff was very similar, however, to that set out in the legislation (a summary of which is provided in Appendix C). The main difference is that the legislation makes reference to the dialling of the phone, which usually cannot be seen by survey staff. Consequently, the results of this survey should be very similar to those that would have been obtained if it had been possible to apply the legislative definition of hand-held mobile phone use.

Observers were equipped with an electronic device that detects the microwave radiation emitted by both hand-held and hands-free mobile phones. It is effective over a range of up to 40 metres. When a mobile phone transmission is detected, the device emits a series of loud beeps and a red LED flashes for a few seconds. The sensitivity of the device is adjustable, making it possible to minimise false readings from, for example, pedestrians using phones. Tests carried out in a range of situations have confirmed that the detector can also detect the signals from the newer 3G phones, in spite of the fact that they operate at a different frequency from conventional mobile phones.

The detector may be triggered by two-way radios that operate at a similar frequency to mobile phones (but are explicitly exempt from the new legislation). It is unlikely that an observer would be able to distinguish a radio handset from a mobile phone so some of these may have been included in the survey.

It is possible for phones to be erroneously detected when they briefly emit microwave radiation to automatically check in to a base station, roughly once every half-hour. They do the same if someone attempts to call the phone, even if it is not answered. A phone used by a passenger would also be detected. The presence of a human observer to check the detector's signal should ensure that only actual instances of drivers' use of mobile phones have been recorded.

The detector worked effectively in most situations but was not totally reliable. Its use was limited in shopping areas due to the large number of pedestrian mobile phone users. The structure of some bridges on motorways and dual carriageways blocked the direct line of sight from the vehicles to the detector. When the detector was triggered on high-speed roads, the speed and volume of traffic often made it difficult to identify which driver was using a phone. Only hand-held mobile phones could be counted at these sites, since these were clearly visible. On the few occasions where a phone was clearly seen to be in use but the detector was not triggered, a positive detection was recorded.

In most cases where the electronic detector was activated, the user was clearly identifiable. Even if a hands-free kit was used the driver could often be seen talking. If the detector was activated but no phone user was visible, the observer had to use their judgement as to whether a hands-free phone was being used. This depended on the presence of pedestrians, the possibility that a passenger was using a phone and the distance to shops and houses. Observers were instructed to count a driver as using a phone only if they were confident that one was in use. Therefore, it is likely that the survey underestimates the true level of mobile phone use.

3.3 Results

109,988 cars were observed in the September 2003 survey, and 1,767 of the drivers (1.6%) were seen to be using a hand-held mobile phone. 27,049 other vehicles were observed and 746 of their drivers (2.8%) were seen to be using a hand-held mobile phone. These are snapshot figures that have not been weighted by the distance travelled on each road type. More detailed analyses are presented later in this section, and compared with results from the October 2002 survey to see how mobile phone use had changed over the intervening year (about 108 thousand cars and 18 thousand other vehicles were observed in the October 2002 survey). Further details of the vehicles observed in September 2003 are provided in Appendix D.

At some sites it was not possible to detect the use of hands-free mobile phones for reasons outlined in Section 3.2. Where reliable observations were possible, 1.3% of car drivers and 1.3% of other drivers were found to be using a hands-free mobile phone. These figures should still be regarded as conservative, lower limits since some phones may not have been detected electronically and there are fewer visual clues if a driver is using a hands-free phone.

More detailed analyses of the data were made using the SPSS statistical package and the results are presented in the following sections; the techniques are described in Appendix D. Experience from the 2002 survey and the Seat Belt Survey has shown that usage levels on Saturdays

are lower than on weekdays, so the main analysis considers only weekday observations.

Hand-held and hands-free phone use and car and other drivers were analysed separately. The following parameters were tested in a statistical model to see whether they affected the level of use of mobile phones.

Road type	Speed limit
Motorways	Built Up (≤ 40 mph)
A roads, dual carriageway	Non Built Up (> 40 mph)
A roads, single carriageway	
Minor roads	

3.3.1 Hand-held phones, car drivers

Road type was found to have a highly significant effect ($p < 0.01$) on the level of hand-held mobile phone use. Speed limit was not found to have a significant effect. The main results for car drivers on weekdays are provided in Table 3.1.

Table 3.1 Proportion of car drivers using hand-held mobile phones, weekdays

Road type	2002	2003	Change
Motorways	2.7%	2.0%	-25%*
A roads, dual carriageway	1.7%	1.2%	-33%*
A roads, single carriageway	1.9%	1.6%	-16%*
Minor roads	1.8%	1.5%	-14%
Overall	2.0%	1.6%	-20%*

The figures for mobile phone use are given to one decimal place.

The percentage changes have been calculated from the exact values.

** Denotes that change was significant at the 5% level.*

Overall figures were calculated by weighting the usage level for each road type by the distance travelled on that type of road and speed limit by all motor vehicles in Great Britain in 2002 and 2003. Appendix D gives details of the data used to calculate the weights. The 95% confidence intervals range from $\pm 0.15\%$ for A roads, dual carriageway to $\pm 0.22\%$ for Minor roads.

In both years, usage levels were highest on motorways; differences between usage levels on other types of road were not significant in 2002, although in 2003 the level was significantly lower on 'A roads, dual carriageway' then on 'A roads, single carriageway' and 'Minor roads'. The recorded level of hand-held mobile phone use dropped overall by 20% between October 2002 and September 2003. This fall can be seen across all road types, suggesting that it is not due to site selection. Although the use of hand-held phones by drivers had not been explicitly prohibited at the time of the 2003 survey, there had been a great deal of publicity about its dangers and the new law which may well already have affected driver behaviour.

3.3.2 Hand-held phones, drivers of other vehicles

The results for the use of hand-held mobile phones by the drivers of other vehicles differ from those for car drivers; the main results are provided in Table 3.2. Road type did not

Table 3.2 Proportion of other drivers using hand-held mobile phones, weekdays

Road type	2002	2003	Change
Motorways	3.9%	3.1%	-20%*
A roads, dual carriageway	3.9%	1.7%	-57%*
A roads, single carriageway	2.5%	3.5%	41%*
Minor roads	3.3%	2.4%	-28%*
Overall	3.3%	2.7%	-18%*

The figures for mobile phone use are given to one decimal place.

The percentage changes have been calculated from the exact values.

** Denotes that change was significant at the 5% level.*

have a statistically significant effect on the use of mobile phones in either 2002 or 2003, but the results have been weighted in the same way as for car driver data. The 95% confidence intervals range from $\pm 0.32\%$ for A roads, dual carriageway to $\pm 0.65\%$ for A roads, single carriageway.

Although the overall level of hand-held phone use by other drivers is much higher than that of car drivers, the falls in use between the two surveys are similar except for single carriageway A roads.

3.3.3 Hands-free phones, car drivers

The 2003 survey measured hands-free use in much greater detail than the 2002 survey; some of the sites used in 2002 were not suitable for monitoring hands-free use due to the proximity of mobile phone masts. The analysis of the 2002 results showed that only speed limit had an effect whereas the 2003 results suggested that both speed limit and road type had an effect. Table 3.3 and Table 3.4 present the main results. The 95% confidence intervals in both tables range from $\pm 0.17\%$ for A roads, dual carriageway to $\pm 0.29\%$ for A roads, single carriageway.

As described in Section 3.2 it was not practicable to accurately observe the use of hands-free mobile phones on motorways. On other roads, an average of 1.7% of car drivers were using hands-free phones on weekdays. In contrast to hand-held use, hands-free use has not fallen. This suggests that some drivers made the decision to invest in a hands-free kit before the new legislation was introduced.

The levels of hands-free use recorded here are significantly higher than those recorded in the seat-belt survey (Table 2.1). This is due to the support provided by the detector when identifying drivers who are using a wireless hands-free kit.

Table 3.3 Proportion of car drivers using hands-free mobile phones, weekdays

Speed limit	2002	2003	Change
Non Built Up (> 40 mph)	2.2%	2.1%	-7%
Built Up (≤ 40 mph)	1.2%	1.4%	21%*
Overall	1.7%	1.7%	3%

The figures for mobile phone use are given to one decimal place.

The percentage changes have been calculated from the exact values.

** Denotes that change was significant at the 5% level.*

Table 3.4 Proportion of car drivers using hands-free mobile phones, weekdays, by road type

Road type	2002	2003	Change
Motorways	n/a	n/a	n/a
A roads, dual carriageway	2.1%	1.1%	-47%*
A roads, single carriageway	1.8%	2.6%	43%*
Minor roads	1.4%	1.4%	2%
Overall	1.7%	1.7%	3%

The figures for mobile phone use are given to one decimal place.

The percentage changes have been calculated from the exact values.

** Denotes that change was significant at the 5% level.*

3.3.4 Hands-free phones, other drivers

Both road type and speed limit were found to affect the use of hands-free mobile phones by other drivers. The proportion using hands-free mobile phones has shown a similar increase to that for car drivers. Table 3.5 and Table 3.6 present the main results. The 95% confidence intervals in both tables range from $\pm 0.25\%$ for A roads, dual carriageway to $\pm 0.50\%$ for A roads, single carriageway.

Table 3.5 Proportion of other drivers using hands-free mobile phones, weekdays

Speed limit	2002	2003	Change
Non built up (>40 mph)	1.9%	2.1%	14%
Built up (≤ 40 mph)	1.3%	1.3%	-5%
Overall	1.6%	1.7%	6%

The figures for mobile phone use are given to one decimal place.

The percentage changes have been calculated from the exact values.

No change was significant at the 5% level.

Table 3.6 Proportion of other drivers using hands-free mobile phones, weekdays, by road type

Road type	2002	2003	Change
Motorways	n/a	n/a	n/a
A roads, dual carriageway	1.0%	0.7%	-32%
A roads, single carriageway	2.1%	2.2%	5%
Minor roads	1.5%	1.8%	19%
Overall	1.6%	1.7%	6%

The figures for mobile phone use are given to one decimal place.

The percentage changes have been calculated from the exact values.

No change was significant at the 5% level.

3.4 Saturdays

Table 3.7 compares the use of mobile phones on weekdays and Saturdays. The comparison is restricted to the 8 sites that were surveyed on a Saturday as well as a weekday, and it can be seen that the weekday results do not match the corresponding overall figures in Tables 3.1-3.6; there are minor differences for hand-held phones but differences are larger for hands-free phones. Although these sites were chosen to cover as many different road types as possible,

Table 3.7 Proportion of drivers using mobile phones on Saturdays

	Weekday	Saturday	Saturday Weekday
Car drivers, hand-held phones	1.7%	0.7%	0.46*
Car drivers, hands-free phones	0.7%	0.4%	0.49*
Other drivers, hand-held phones	2.8%	1.8%	0.63*
Other drivers, hands-free phones	0.4%	0.4%	0.96

The figures for mobile phone use are given to one decimal place.

The Saturday to weekday ratios have been calculated from the exact values.

** Denotes that weekday and Saturday proportions differ significantly at the 5% level.*

they are not as representative as the full set of sites. The results presented below are sample estimates of mobile phone use for the sites observed, and have not been weighted to reflect the population.

Car drivers were half as likely to be using a phone on a Saturday as on a weekday. Other drivers were also less likely to be using hand-held phones on a Saturday than on a weekday, although the difference was less than for car drivers.

3.5 Summary

Table 3.8 presents the overall level of mobile phone use found by the 2002 survey, adjusted for vehicle kilometres travelled on each road type. Table 3.9 presents the corresponding results for the 2003 survey.

Table 3.8 Proportion of drivers using mobile phones, weekdays, 2002

Type of phone	Car drivers	Other drivers
Hand-held	2.0%	3.3%
Hands-free	1.7%	1.6%
Overall	3.6%	4.9%

Table 3.9 Proportion of drivers using mobile phones, weekdays, 2003

Type of phone	Car drivers	Other drivers
Hand-held	1.6%	2.7%
Hands-free	1.7%	1.7%
Overall	3.3%	4.4%

Comparison of these results shows that the overall level of hand-held phone use fell by about one fifth-between October 2002 and September 2003. This may be related to increased awareness of the dangers of mobile phone use following publicity in advance of legislation taking effect in December 2003.

Other drivers were more likely than car drivers to be using a hand-held mobile phone. This is worrying as accidents involving these vehicles tend to be more severe than car accidents. The majority of other mobile phone users were still using hand-held phones.

Drivers were observed using their phones in particularly hazardous situations, such as while negotiating roundabouts, and very few drivers were seen to stop in order to avoid the risk of using a mobile phone. For example, 5 survey sites were in lay-bys but very few drivers used their phones whilst parked in these lay-bys.

A further Mobile Phone Survey was carried out in April 2004, and the results have been reported by Hill (2005). The report analyses the effects of the legislation which took effect in December 2003 to prohibit the use of hand-held mobile phones by the drivers of motor vehicles.

4 Conclusions

This report has documented the two series of surveys of drivers' use of mobile phones that had been carried out by TRL by the end of 2003. The extension of the Seat Belt Survey provided the first information, and tracked the growth in use from October 2000. The limitations imposed by the methodology led to the development of the more technically advanced Mobile Phone Survey, which uses an electronic detector to detect mobile phone transmissions and began in October 2002. Comparison of results for the two surveys in the Crowthorne area suggests that the Seat Belt Survey has recorded the use of hand-held phones reliably but has observed only about one third of the use of hands-free phones.

This demonstrates the value of using the electronic detector to assist human observers. This ability to observe the use of hands-free phones reliably will be crucial in future since, if the regulation which came into force on 1 December 2003 proves effective, the mobile phones used by drivers will be predominantly hands-free.

The Mobile Phone Survey carried out in September 2003 found that 1.6% of car drivers were using hand-held mobile phones on weekdays and 1.7% were using hands-free phones, averaged over all types of road, so in total 3.3% of drivers were using mobile phones. Among drivers of other types of vehicle, 2.7% were using hand-held mobile phones and 1.7% were using hands-free phones, i.e. 4.4% of these drivers were using mobile phones. Car drivers were half as likely to be using a phone on a Saturday as on a weekday. Other drivers were also less likely to be using a phone on a Saturday, although the difference was less than for car drivers.

The Seat Belt Survey has produced one result that the Mobile Phone Survey could not have achieved. It has demonstrated that car drivers who were using mobile phones were more than twice as likely to not wear a seat belt as non-users, and a similar difference was also found among van drivers. This may indicate that using a mobile phone and driving whilst unbelted are manifestations of a person's general willingness to take risks while driving, or indifference to or ignorance of these risks.

This finding has worrying implications for compliance with the new mobile phone regulation. It has been illegal for a car driver to drive without wearing a seat belt since 1983, with very few exceptions, so the willingness of many mobile phone users to flout a long-established law

suggests that compliance with the new regulation may be relatively poor. Another Mobile Phone Survey was carried out in April 2004 and has assessed the initial impact of the new regulation (Hill, 2005).

Unlike the Mobile Phone Survey, the Seat Belt Survey records personal details of drivers. These data show that the level of phone use falls with age, being very low among drivers at least 60 years old. It is slightly higher among men than among women.

The geographical coverage of the Seat Belt Survey is much wider than of the Mobile Phone Survey, and it has found clear differences between its survey areas in the level of phone use. It will be important in future to extend the Mobile Phone Survey to other areas in order to build up a picture of phone use across England.

5 Acknowledgements

The work described in this report was carried out in the Safety Group of TRL Limited. The authors are grateful to Gavin Buckle who carried out the analyses of data from the Seat Belt Survey.

6 References

- Broughton J (1990).** *Restraint use by car occupants, 1982-89.* Research Report RR289, TRL Limited, Crowthorne.
- Broughton J (2003).** *Seat belt wearing rates in cars in England, 1998-2002.* TRL Report TRL580: TRL Limited, Crowthorne.
- Burns P C, Parkes A, Burton S, Smith R K and Burch D (2002).** *How dangerous is driving with a mobile phone? Benchmarking the impairment to alcohol.* TRL Report TRL547. Crowthorne: TRL Limited
- Hill J P (2005).** *A survey of mobile phone use by drivers, April 2004.* TRL Report TRL635. Crowthorne: TRL Limited
- Oftel (2003).** *Consumers' use of mobile telephony Q14 August 2003.* Retrieved: 2003, from <http://www.oftel.gov.uk/publications/research/2003/q14mobres1003.pdf>

Appendix A: List of survey sites

Seat Belt Survey

<i>Site No.</i>	<i>Site name</i>	<i>Survey day</i>	<i>1st Road No.</i>	<i>OSGR</i>
1	Henley	Wednesday	A4130	SU 764827
2	Streatley	Tuesday	A329	SU 591808
3	Reading	Friday	A4 London Rd	SU 725731
4	Sonning	Monday	B478	SU 756758
5	Pirbright	Tuesday	A324	SU 944568
6	Rackstraws	Tuesday	A321	SU 847614
7	Camberley	Wednesday	Park St. Unclass.	SU 874604
8	Fleet	Thursday	A3013	SU 812546
9	Farnham	Friday	A31	SU 844466
10	Milford	Friday	Formerly A3	SU 944424
11	Hindhead	Monday	A3	SU 888357
12	West Meon	Monday	A32	SU 650261
13	Southampton	Friday	A33	SU 418154
14	Blackwater	Thursday	A331	SU 856598
15	Petworth	Monday	East St.	SU 977217
16	Windsor	Monday	B3022	SU 953756
17	Sunbury	Wednesday	A316	TQ 101701
18	Isleworth	Wednesday	A3004	TQ 167744
19	Chiswick	Monday	A316	TQ 205765
20	Chiswick	Friday	Sutton Ct. Rd. unclassified	TQ 205780
21	Rotherham	Thursday	A631	SK 444902
22	Kiveton	Monday	A57	SK 496851
23	Eckington	Thursday	B6052	SK 435799
24	Sutton-in-Ashfield	Friday	A38	SK 490589
25	Sutton-in-Ashfield	Tuesday	B6018	SK 490589
26	Radcliffe on Trent	Wednesday	A52	SK 656395
27	Sutton-in-Ashfield	Friday	A611	SK 528569
28	Annesley Woodhouse	Friday	A611	SK 509538
29	Nottingham	Tuesday	A60	SK 569418
30	Nottingham	Tuesday	A611 (Magdela Road)	SK 569418
31	Radcliffe	Thursday	Bingham Road	SK 656395
32	Shepshed	Thursday	A512	SK 474182
41	Henley	Saturday	A4130	SU 764827
42	Fleet	Sunday	A3013	SU 812546
43	Farnham	Saturday	A31	SU 844466
44	Sunbury	Sunday	A316	TQ 101701
45	Rotherham	Sunday	A631	SK 444902
46	Sutton-in-Ashfield	Saturday	A38	SK 490589
47	Nottingham	Sunday	A60	SK 569418
48	Shepshed	Saturday	A512	SK 474182

Mobile phone survey

<i>Site No.</i>	<i>Road</i>	<i>Location</i>	<i>Carriageway type</i>	<i>Speed limit</i>
1	M3	Taplins Farm Lane	Motorway 3 lanes	70 mph
2	Taplins Farm Lane	Bridge over M3	Single Carriageway	60 mph
3	A30	Near Hartley Wintney Golf Club	Single Carriageway	30 mph
4	Dilly Lane	Hartley Wintney	Single Carriageway	30 mph
5	M3	Bridge off Windlesham Lane	Motorway 3 lanes	70 mph
6	B3349	Layby near Heckfield	Single Carriageway	60 mph
7	A412	Georges Green, Slough	Dual Carriageway, 2 Lanes	70 mph
8	B3011	South of Holdshott farm	Single Carriageway	50 mph
9	Church Lane	O/S Wexham Church, Slough	Single Carriageway	40 mph
10	A329	The Crown, Lower Basildon	Single Carriageway	30 mph
11	A4074	Layby, 2km north of Woodcote	Single Carriageway	60 mph
12	A25	Reigate, Market Hall	One-way, 2 lanes	30 mph
13	Emmbrook Road	Near bridge	Single Carriageway	20 mph
14	A329, Rectory Road	N.E. of Glebelands Road	One-way, 2 lanes	30 mph
15	A322	FB nr Coral Reef	Dual Carriageway, 2 Lanes	70 mph
16	Crowthorne High Street	O/S Baptist Church	Single Carriageway	20 mph
17	Ralphs Ride	Corner with Lowbury	Single Carriageway	30 mph
18	A3	Liss	Dual Carriageway, 2 Lanes	70 mph
19	A4	Woolhampton, Layby	Single Carriageway	60 mph
20	Un-named road	Bucklebury Common	Single Carriageway	60 mph
21	B3430, 9 mile ride	Layby nr Lookout	Single Carriageway	50 mph
22	A3016, Upper Hale Road	Upper Hale	Single Carriageway	40 mph
23	B3411, Ash Hill Road	Ash	Single Carriageway	30 mph
24	A4	Hare Hatch, Garden Centre	Single Carriageway	60 mph
25	A4130	Hurley	Single Carriageway	50 mph
26	M4	FB off Little Benty	Motorway 4 lanes	70 mph
27	M25	Iver, Victoria Crescent	Motorway 4 lanes	70 mph
28	M40	Hedgerly Lane, Beaconsfield	Motorway 4 lanes	70 mph
29	A33	3 Mile Cross	Dual Carriageway, 2 Lanes	70 mph
30	B3349, School Road	Arborfield	Single Carriageway	20 mph
31	B3000	The Street, Compton	Single Carriageway	30 mph
32	A31, Hogs Back	Layby	Dual Carriageway, 2 Lanes	60 mph
33	A25	Newlands Corner	Single Carriageway	60 mph
34	A322, Onslow Street	Guildford	Dual Carriageway	30 mph
35	A301	Waterloo Bridge	Dual Carriageway, 2 Lanes	30 mph
36	B364	Thames Ditton	Single Carriageway	20 mph
37	Molesey Road	Layby Opposite QEII Reservoir	Single Carriageway	40 mph
38	Swing Swang Lane	Basingstoke	Single Carriageway	20 mph
39	A30	Hook	Single Carriageway	30 mph

Appendix B: Phone users and non-users

Table 2.3 showed that drivers using mobile phones were less likely than to wear a seat belt than non-users. It pointed out the Survey is only able to record drivers' behaviour as they pass the survey point, so some drivers who were not observed using a phone may have just finished making a call, or may have begun a call shortly afterwards. It will be shown that the difference between the wearing rates of drivers who sometimes use their phones and drivers who never use a phone is greater than shown by the table.

In principle, each of the drivers observed was in one of three categories:

A never uses a mobile phones;

B sometimes uses a mobile phone, but was not using it when observed at the survey point;

C was observed using a mobile phone.

The ideal comparison would be between A and the 'potential phone users' B+C, but Table 2.3 can only compare A+B with C. The wearing rates for B and C should be the same since it is largely a matter of chance whether a potential user would be using a phone at any specific moment. Consequently, the wearing rate for A is greater than the rate for A+B, while the wearing rate for B+C is the same as for C, so the difference between the wearing rate of users and non-users (A and B+C) is greater than the table suggests.

A simple mathematical model can represent this effect. The proportion of driving time that users spend using a phone is not known, but suppose for example that it amounts to 10% on average. This assumption implies that 23% of car drivers in Spring 2003 would have been potential users; the wearing rate of non-users would have been 94.0%, compared with 80.2% for users. The effect is even larger for van drivers; the same assumption implies that 37% of them were potential users in Spring 2003 and the wearing rate of non-users was 71%.

Other assumptions about the proportion of a driver's time spent using a phone yield alternative numerical results, but all imply that the wearing rate of non-users in April 2003 was above the level shown in Table 2.3. Only a candid survey that asked drivers about their use of mobile phones could help to show which assumption was the most realistic, and allow a reliable adjustment to be made.

Appendix C: Summary of mobile phone regulation

The following extract is from a document issued by the Department for Transport describing the new regulation.

Legislation on Mobile Phones and Driving Frequently Asked Questions

In a new regulation due to come into force on 1 December 2003, it is a specific offence to use a handheld phone, or similar device, when driving. The penalty is a £30 fixed penalty or up to £1,000 on conviction in court (£2,500 for drivers of goods vehicles, buses or coaches). Drivers still risk prosecution (for failure to have proper control) if they use hands-free phones when driving.

Q1. What does the regulation say about hand-held phones?

The use of a hand-held phone or similar hand-held device while driving will be prohibited. A handheld device is something that 'is or must be held at some point during the course of making or receiving a call or performing any other interactive communication function'. A device is 'similar' to a mobile phone if it performs an interactive communication function by transmitting and receiving data. Examples of interactive communication functions are sending and receiving spoken or written messages, sending or receiving still or moving images and providing access to the internet.

Appendix D: Technical details

Table D1 Number of vehicles observed, September 2003 survey

	<i>Cars</i>	<i>Others</i>
<i>On weekdays, by road type</i>		
Motorways	37,652	11,515
A roads, dual carriageway	16,511	5,255
A roads, single carriageway	17,088	4,491
Minor roads	15,279	3,401
Non Built-Up	24,358	6,190
Built-Up	62,172	18,472
Total	86,530	24,662
<i>Sites surveyed on Saturdays</i>		
Weekdays	30,031	7,648
Saturdays	23,458	2,387
Total	53,489	10,035

Analysis of Variance was carried out on the logit of the proportion of drivers using a phone. The logit transform is used to normalise proportions so that standard analysis techniques can be used.

$$\text{Logit}(p) = \ln(p/1-p)$$

Separate analyses were performed on car drivers and ‘other’ drivers and on hand-held and hands-free phone use.

Overall levels of mobile phone use were calculated using weighted figures based on the distance travelled by all motor vehicles in Great Britain on individual road types. This was obtained from a number of sources. From 2003 the DfT has generally summarised traffic data by the land use classification of urban/rural rather than the speed limit classification of built up/non built up. It was not therefore possible to use the DfT’s standard tables. A database of flows that had previously been provided to TRL by the DfT was used to obtain the figures for major roads, split by speed limit, road type and carriageway type. Figures for minor roads, split by speed limit, were taken from the 2002 edition of Transport Statistics Great Britain and grossed up to match the 2002 minor road total. Speed limit was not available for a small number of roads; in these cases the rural/urban classification was used as a proxy.

Table D2 Distance travelled by motor vehicles on GB roads (10⁸ vehicle kilometres), 2002

	<i>Non Built-Up (>40mph)</i>	<i>Built-Up (≤40mph)</i>
Motorways	924	–
A roads, dual-carriageway	677	189
A roads, single-carriageway	728	588
Minor roads	494	1258
Total	2823	2036

Abstract

The ownership and use of mobile phones grew rapidly in the United Kingdom from the early 1990s, until 73% of adults owned or used a mobile telephone by 2003. Many owners were willing to use their phones whilst driving, in spite of growing concerns about the implications for road safety. This Report presents results from two sets of surveys that have been carried out by TRL on behalf of the Department for Transport and produce complementary evidence about drivers' use of mobile phones.

The Seat Belt Survey has been carried out regularly for many years, observing seat belt use in stationary traffic mainly at junctions controlled by traffic signals. In October 2000 the survey was expanded to observe the use of mobile phones. Seven surveys were carried out between October 2000 and October 2003 in extensive study areas centred on Crowthorne and Nottingham, and a further six surveys were carried out in additional areas of England.

The Mobile Phone Survey uses an electronic detector to warn a human observer that a mobile phone is being used in the vicinity. This allows drivers' use of mobile phones to be observed in freely flowing traffic. Following preliminary trials, full scale surveys were carried out in October 2002 and September 2003 in an extensive study area in the South East of England.

Related publications

- TRL635 *A survey of mobile phone use by drivers, April 2004* by J P Hill. 2005 (price £30, code EX)
- TRL582 *Work-related road accidents* by J Broughton, C Baughan, L Pearce, L Smith and G Buckle. 2003 (price £25, code AX)
- TRL580 *Seat belt wearing rates in cars in England, 1998-2002* by J Broughton. 2003 (price £25, code AX)
- TRL547 *How dangerous is driving with a mobile phone? Benchmarking the impairment to alcohol* by P C Burns, A Parkes, S Burton, R K Smith and D Burch. 2002 (price £40, code JX)
- RR289 *Restraint use by car occupants, 1982-89* by J Broughton. 1990 (price £25, code E)

Prices current at April 2005

For further details of these and all other TRL publications, telephone Publication Sales on 01344 770783, email: publications@trl.co.uk, or visit TRL on the Internet at www.trl.co.uk.