



What key factors are associated with feeling safe driving on England's motorways and major 'A' roads?

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Executive Summary

Kantar conducted a ‘deep dive’ analysis of which aspects of road users’ journeys are associated with feeling safe, and feeling less safe, when driving on England’s motorways and major ‘A’ roads, the Strategic Road Network (SRN). The analysis was based on results from the Strategic Roads User Survey (SRUS) for journeys made between April 2018 and January 2020. A two-stage analysis process was conducted: first, which factors in isolation were most associated with feeling safe and less safe; and second, determining which combinations of factors resulted in the highest and lowest levels of feeling safe using a Chi-square Automatic Interaction Detector process (CHAID).

Headline results

The factors most associated with how safe drivers felt, once all others are controlled for are: 1) satisfaction with signage when joining the SRN road; 2) satisfaction with SRN road markings; 3) confidence level when driving on motorways; 4) main emotion whilst driving; and 5) traffic level.

The CHAID analysis identified six groups of drivers based on a combination of these factors that best explained how safe drivers feel; the level of feeling ‘very safe’ ranged from 77% down to 24%. The factors and their answer ratings for each group are shown below. It should be noted that the findings only identify relationships between feeling safe and other the variables in the survey; no claims about the causality of any such relationships or the direction in which they operate can be made. Any factors not listed are not significant for the group concerned.

% feeling very safe	Factors most associated with feeling very safe and their answer ratings*	
Group 1: 77%	Signage joining junction:	‘Very satisfied’
Group 2: 61%	Signage joining junction: Road marking:	Not ‘Very satisfied’ ‘Very satisfied’
Group 3: 60%	Signage joining junction: Road marking: Motorway driving confidence: Emotion: Traffic:	Not ‘Very satisfied’ Not ‘Very satisfied’ Score 10 out of 10 (most confident) Relaxed/calm/happy/no specific emotion Light
Group 4: 42%	Signage joining junction: Road markings: Motorway driving confidence: Emotion: Traffic:	Not ‘Very satisfied’ Not ‘Very satisfied’ Score 10 out of 10 Relaxed/calm/happy/no specific emotion Moderate/heavy/congested
Group 5: 30%	Signage joining junction: Road markings: Motorway driving confidence: Emotion:	Not ‘very satisfied’ Not ‘very satisfied’ Score 10 out of 10 Have an emotion while driving but not relaxed/calm/happy
Group 6: 24%	Signage joining junction: Road markings: Motorway driving confidence:	Not ‘very satisfied’ Not ‘very satisfied’ Score 0 to 9

1. Introduction

1.1 About the SRUS

The Strategic Roads User Survey (SRUS), conducted by Kantar until 31 March 2020 on behalf of Transport Focus, asks questions about a range of aspects of journey experience on the Strategic Road Network (SRN). This is the motorway and major 'A' road network in England managed by Highways England on behalf of the Department for Transport. The topics covered by the survey include overall journey experience, journey time, surface quality, roadworks management, permanent and electronic information, and feelings of safety.

The SRUS provides a detailed picture of the experience of all drivers, whether in cars, vans, lorries, or coaches, or as motorcyclists. It generates data, which are made available to those who manage specific roads to help them understand users' views and prioritise where to make improvements.

The survey is based on an annual sample of around 8,500 drivers about a journey on the road network managed by Highways England in the preceding four weeks. Each driver is asked questions about their last journey on a single SRN road within it (referred to as 'one road') even if they used more than one SRN road on the same journey.

1.2 Objectives and methodology

In addition to conducting the main survey, Kantar was commissioned to conduct an additional 'deep dive' analysis to explore which aspects of a road user's journey are associated with feeling either more safe or less safe when driving on the SRN. The objectives were to discover:

- Which types of drivers (for example by age, annual mileage, confidence on motorways) feel safest when driving?
- Which types of journey are associated with the highest and lowest feelings of safety?
- Are feelings of safety associated with views about other aspects of the road?

The outcome measure used in this report is based on the following question: *How safe did you feel travelling as a driver on the [SELECTED ONE ROAD] on [DATE OF TRAVEL]?* Response list: *Very safe; Fairly safe; Neither safe nor unsafe; Fairly unsafe; Very unsafe; Don't know.*

A two-stage methodology was used:

- First, we examined which factors in isolation were most associated with feeling safe or less safe when driving.
- Second, we examined which factors across the survey, in combination, were associated with highest and lowest levels of feeling very safe. To do this a Chi-square Automatic Interaction Detector (CHAID) analysis was performed. CHAID is a form of analysis that

determines how variables best combine to explain the outcome - in this case feelings of safety - once all variables are controlled for.

The data are based on all road users who made journeys between April 2018 and January 2020, a total sample of 15,903 respondents. All findings in this report are based on unweighted data, as the analysis is based on individual driver profiles and their journeys, rather than journeys at an aggregate level.

In addition to the data, Transport Focus provided an additional variable to consider within the analysis. It was a segmentation designating each SRN road within a Highways England Area into either one of three motorway categories or one of three 'A' road categories based on the predominating characteristic of the road in that Highways England Area, as follows:

- Category A. Smart Motorways, whether 'all-lane running' or 'dynamic hard shoulder'
- Category B. Other motorways, in predominantly urban (conurbation) or suburban areas
- Category C. Other motorways in predominantly rural areas
- Category D. 'A' roads on the SRN that are dual carriageway with over bridges/under-bridges at junctions, so designed to be predominantly free flowing
- Category E. 'A' roads on the SRN which have stretches of both dual and single carriageway
- Category F. 'A' roads on the SRN which are predominantly single carriageway

This report is structured as follows:

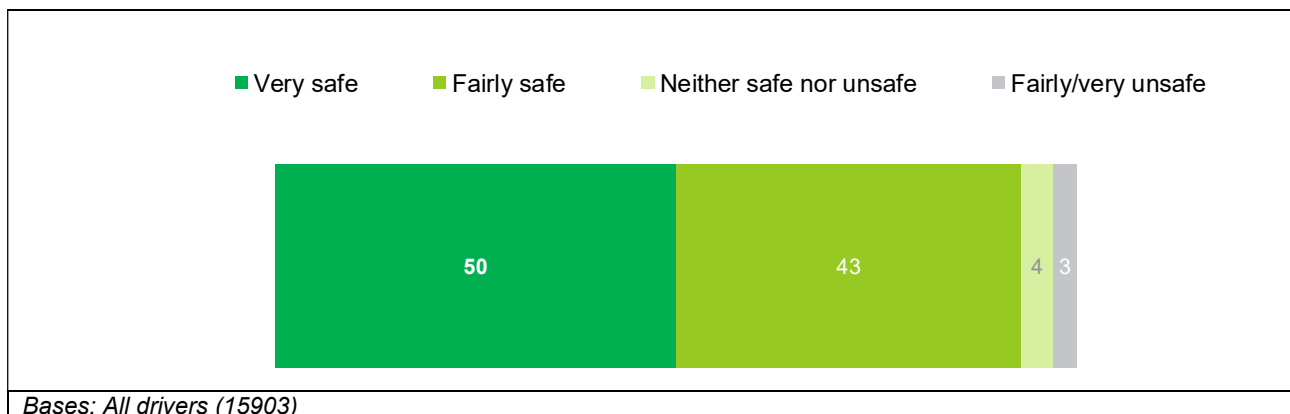
Section 2 considers the variation in feelings of safety by road user type, type of journey, behaviour of other drivers and satisfaction with aspects of the road.

Section 3 brings these factors together using a CHAID analysis. This is a form of analysis that determines how different attributes best combine to explain an outcome (in this case feelings of safety). This results in a 'tree' which helps to visualise which groups of road user are most and least likely to feel very safe when driving on motorways and major 'A' roads.

2. What factors are associated with feelings of safety when driving?

Overall, when driving on the selected 'one road', 50% of drivers felt 'very safe', 43% felt 'fairly safe', 4% 'neither safe nor unsafe' and 3% felt unsafe (see Figure 2A).

Figure 2A: How safe drivers feel when driving on the selected 'one road'



The extent to which drivers feel safe when driving is related to a range of both driver and journey characteristics as indicated in the sections below.

2.1 Driver characteristics

The following groups of drivers were most likely to feel 'very safe':

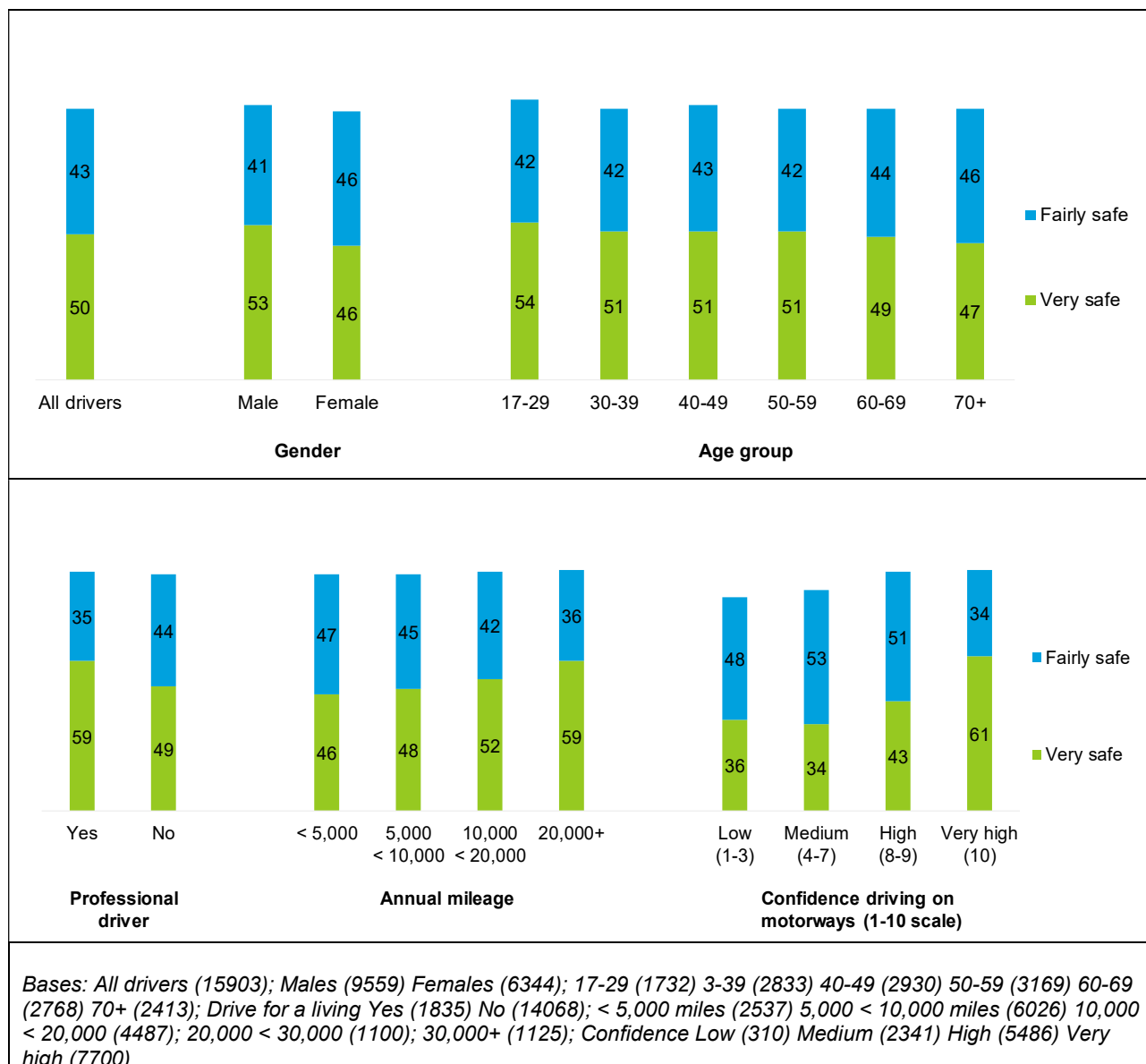
- Male drivers (53% compared with 46% of female drivers)
- Younger drivers (54% of those aged 17 to 29 compared with 49 to 51% of those aged 30 to 69 and 47% of those aged 70+)

The level of feeling safe was also associated with various measures which relate to the level of experience and confidence in driving, with more experienced and confident drivers generally more likely to feel safe. The following groups of drivers were most likely to feel 'very safe' when driving:

- Those who drive for a living (59% compared with 49% who do not)
- Road users with an annual mileage of at least 20,000 miles (59% compared with 46% of those who drive less than 5,000 miles a year)
- Those who feel very confident driving on motorways (61% of those who feel very highly confident compared with 34-36% among those with low to medium levels of confidence).

These findings are summarised in Figure 2B.

Figure 2B: Proportion who feel 'very safe' or 'fairly safe' by driver characteristics



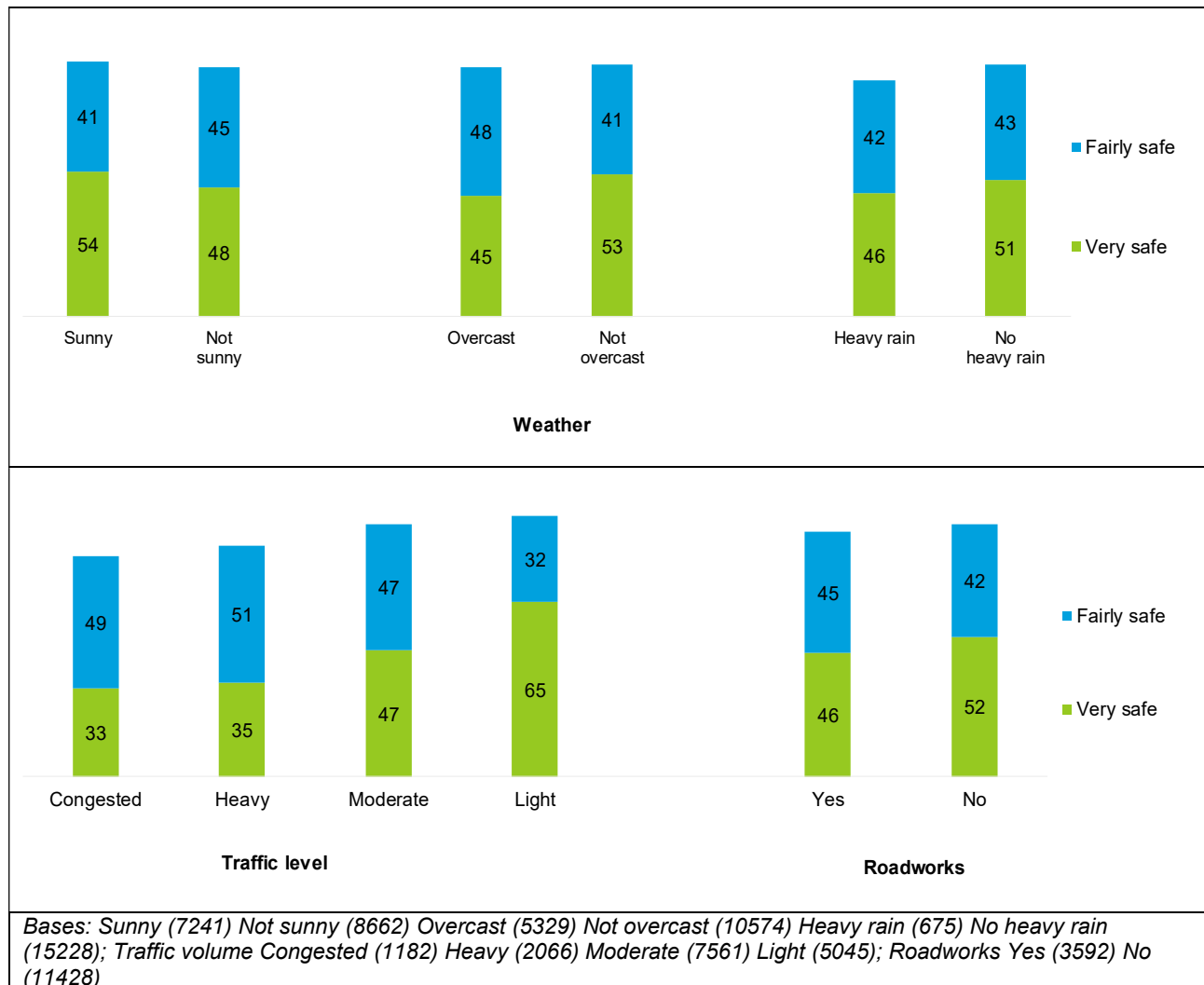
2.2 Journey characteristics

Some journey types were associated with lower levels of 'feeling safe' than others. Drivers on the following journeys were less likely to feel 'very safe' than others (see Figure 2C):

- Those driving in weather that was not sunny (48% compared with 54% when sunny), overcast (45% compared with 53% when not overcast), or when driving in heavy rain (46% compared with 51% when not raining)
- Those driving in congested (33%) or heavy (35%) traffic compared with those driving in light traffic (65%).
- Those who encountered roadworks on the journey (46% compared with 52% who did not)

There was no difference in the propensity to feel safe by type of road category¹: between 48% and 52% felt 'very safe' and between 92% and 95% felt 'very' or 'fairly' safe on each type of road.

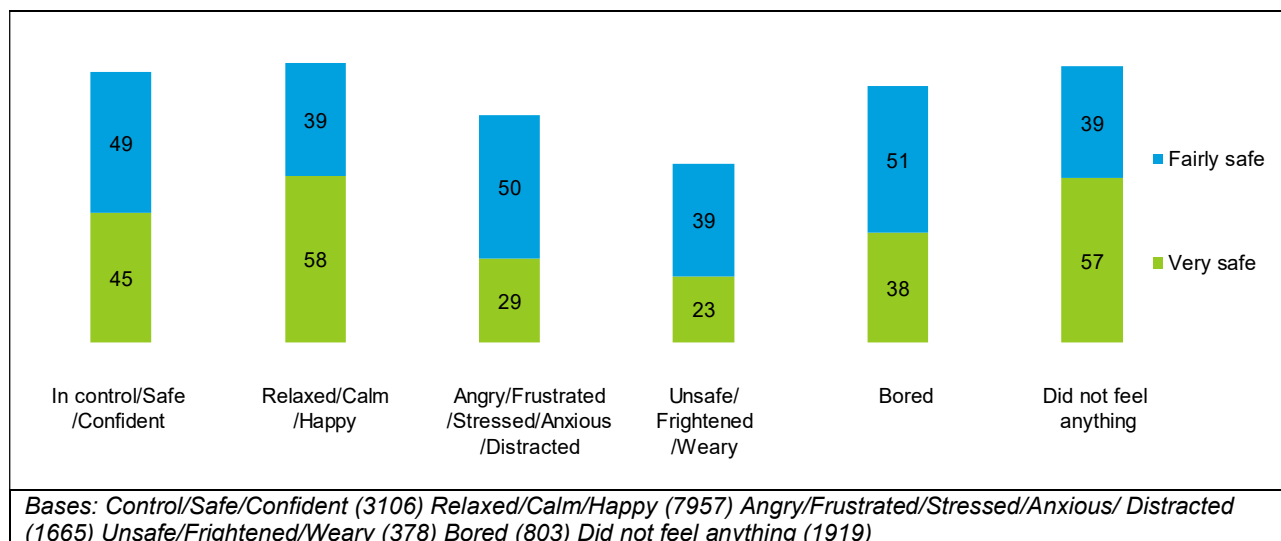
Figure 2C: Proportion who feel 'very safe' or 'fairly safe' by journey characteristics



In addition, the main emotion felt during the journey was strongly associated with feelings of safety (Figure 2D). As would be expected the propensity to feel 'very safe' was especially low when drivers felt frightened, unsafe or weary (23%) or angry/frustrated/stressed (29%) and drivers experiencing these emotions were also much less likely to feel safe overall (that is feel either very or fairly safe). The propensity to feel 'very safe' was higher for drivers who felt relaxed, calm, or happy (58%) or who recalled no specific emotion when driving (57%) compared to 50% among all drivers.

¹ As based on a segmentation of road types provided by Transport Focus; see section 1 for more detail.

Figure 2D: Proportion who feel ‘very safe’ or ‘fairly safe’ by main emotion while driving



2.3 Behaviour of other drivers

The propensity to feel ‘very safe’ was lowered when the driver had encountered poor or dangerous driving. For example, less than two-fifths felt very safe when encountering driving (veering) into a hard shoulder, verbal or other abuse, jumping traffic lights, sudden braking and pulling out dangerously (Table 2E).

Table 2E: Driving behaviours significantly associated with feeling ‘very safe’

The table shows where there was a significant difference (at the 5% level) in feeling very safe for drivers witnessing various types of other drivers’ behaviour vs. those not witnessing it

	% who feel very safe	Base: all witnessing each behaviour
All drivers	50	15903
After witnessing....		
Driving (veering) into hard shoulder	31	105
Verbal or other abuse	32	114
Jumping traffic lights	37	319
Sudden braking	38	886
Vehicles pulling out dangerously	39	1118
Road rage	40	340
Driving too close	41	2241
Poor overtaking	41	2361
Driver using mobile phone	41	1065
Not paying attention	40	973
Drivers cutting me up	43	1754
Speeding	43	3244
Not signalling	44	2264
Undertaking	44	1570
Very slow driving for type of road	45	797
Middle lane hogging	46	2285

2.4 Satisfaction with signage and road markings

The propensity to feel 'very safe' was also associated with driver satisfaction with road surfacing, road signage and other aspects of the road. Drivers who were satisfied with the quality of the road and various aspects of road signage and road markings were generally more likely to feel 'very safe' than those who were dissatisfied with any of these aspects.

Table 2F: All aspects of the road where there was a significant difference ($p < 0.05$) in feeling very safe between those who rated that aspect satisfied compared to dissatisfied.

Note the proportion of drivers who feel very safe across the whole survey is 50%.

Aspect of the road	% feeling very safe by rating of that aspect of the road'		Percentage point difference	Base:
Amount of litter on the road & verge	Satisfied	53	+10	9905
	Dissatisfied	44		1512
Cats eyes	Satisfied	59	+14	2006
	Dissatisfied	45		154
Ease of joining the road	Satisfied	50	+23	6611
	Dissatisfied	27		369
Electronic signs	Satisfied	52	+20	8047
	Dissatisfied	32		472
Permanent signs	Satisfied	53	+21	13429
	Dissatisfied	32		435
Road lighting	Satisfied	59	+16	2033
	Dissatisfied	44		363
Road marking	Satisfied	53	+19	14088
	Dissatisfied	34		568
Road surface	Satisfied	54	+17	12847
	Dissatisfied	37		1690
Signage and markings when joining the road	Satisfied	50	+23	6719
	Dissatisfied	27		203
Safety when joining the road	Satisfied	50	+23	6592
	Dissatisfied	28		359

3. What factors in combination help explain feeling safe or unsafe?

3.1 Introduction to CHAID analysis

Section 2 showed the characteristics of the driver and journey associated with feelings of safety. This section describes the results of the CHAID analysis, a form of analysis that determines how variables best combine to explain the outcome - in this case a tendency to feel more safe or less safe, once all other variables are controlled for.

CHAID analysis looks for interactions of variables within a data set. It divides the sample through a series of splits across a set of independent variables (in this case driver and journey characteristics), to produce the greatest difference in results in an outcome variable (in this case levels of feeling safe). Taking the percentages who state that they feel either 'very safe', 'fairly safe', 'neither safe nor unsafe', or 'unsafe' etc., the analysis examines all the other input variables to discover where there is greatest difference. Using the chi-square test, the CHAID analysis then splits the outcome variable into two or more categories that are called the initial, or parent nodes. Those nodes are further split until no further statistically significant splits can be made and these end points are called terminal nodes. The output is visualised in the form of a tree diagram.

3.2 CHAID analysis for 'feeling safe'

In this analysis, the outcome variable was a four-way split of the response to the question of '*How safe did you feel as a driver on the [name of SRN road]?*'. The four-way split was: a) very safe; b) fairly safe; c) neither safe nor unsafe; and d) unsafe (combining fairly unsafe and very unsafe²).

A CHAID model was also trialled on a two-category basis ('very safe' versus the remainder). However, both methods produced an identical tree, and therefore the more descriptive four-category dependent variable was used.

The input variables included all those covered within in Section 2 (these being the independent variables), so not limited to those found to be most associated from the first stage of analysis. This was to ensure all possible combinations of variables would be assessed and controlled for by the CHAID analysis. The variables were as follows:

- I. **Driver characteristics:** age, gender, disability, annual mileage, licence holding length, level of confidence on motorways
- II. **Journey characteristics:** journey purpose, light and weather conditions, time of day, type of road, whether driving with passengers, main emotion while driving, importance of arrival time, distance travelled on selected road, traffic congestion, behaviours witnessed while driving, satisfaction with road signage and other aspects of the road, whether passed any roadworks

Figure 3B shows the 'decision tree' output from the CHAID. The results are split out into levels, with the first level showing the characteristics that are most significant in differentiating between feeling very safe and feeling less safe. The second level shows which characteristics are next best

² Categories were combined due to small base sizes

at differentiating feelings of safety within those categories identified in the first level, and so on. This shows that the most discriminating factors which explain feelings of safety are (broadly in order):

- Satisfaction with joining junction signage
- Satisfaction with road markings
- Level of confidence in motorway driving
- Emotion while driving
- Level of traffic

There are ten combinations of the independent variables outlined earlier in the section which correspond with a node shown numbered as nodes one to ten, of which six are ‘terminal’ nodes: nodes 1, 3, 10, 9, 8, and 5. These six ‘CHAID terminal nodes’ represent the combinations of variables, in rank order, most associated with feeling safe or unsafe and are shown in Table 3A below. They are shown ranked by level of feeling very safe (on the SRN ‘one road’). Note that the proportion feeling very safe across the whole survey was 50%, and all feeling safe (very safe or fairly safe) was 93%.

Table 3A. Groups of drivers who are most and least likely to feel safe

% feeling: very safe; safe overall	Factors most associated factors and answer ratings*		CHAID node: see fig. 3B.
Group 1: 77%; 97%	Signage joining junction:	‘Very satisfied’	1
Group 2: 61%; 95%	Signage joining junction: Road marking:	Not ‘Very satisfied’ ‘Very satisfied’	3
Group 3: 60%; 98%	Signage joining junction: Road marking: Motorway driving confidence: Emotion: Traffic:	Not ‘Very satisfied’ Not ‘Very satisfied’ Score 10 out of 10 (most confident) Relaxed/calm/happy/no specific emotion Light	10
Group 4: 42%; 96%	Signage joining junction: Road markings: Motorway driving confidence Emotion: Traffic	Not ‘Very satisfied’ Not ‘Very satisfied’ Score 10 out of 10 Relaxed/calm/happy/no specific emotion Moderate/heavy/congested	9
Group 5: 30%; 86%	Signage joining junction: Road markings: Motorway driving confidence Emotion:	Not ‘very satisfied’ Not ‘very satisfied’ Score 10 out of 10 Have an emotion while driving but not relaxed/calm/happy	8
Group 6: 24%; 89%	Signage joining junction: Road markings: Motorway driving confidence:	Not ‘very satisfied’ Not ‘very satisfied’ Score 0 to 9	5

* Any factors not listed are not significant for that group.

This indicates that feeling very safe tends to be experienced by those who were very satisfied with the signage when joining the SRN (the 'one road'), or with the road markings. The highest levels of feeling 'very safe' were found among drivers who felt very satisfied with signage at the junction where they joined.

On the other hand, feeling less safe (i.e. not 'very safe') tends to be experienced by drivers who felt less satisfied with the signage when joining the SRN (the 'one road'), or with road markings. This is exacerbated when the driver was a less confident motorway driver, when they were not feeling relaxed, and when there was heavy traffic congestion. The lowest levels of feeling 'very safe' were found among drivers who were less satisfied with signage at junctions and with road markings and who lacked high levels of confidence when driving on motorways.

The decision tree of the full ten nodes of the combinations of factors is shown on the following page.

It should be noted that the findings only identify relationships between feeling safe and other variables in the survey, and we can make no claims about the causality of any such relationships or the direction in which they apply. For example, we cannot say whether feeling more confident on motorways leads to drivers feeling safer, or whether feeling safer on the roads leads to greater levels of confidence.

Figure 3B: Decision Tree output

