RAC Foundation

Mobility • Safety • Economy • Environment

RCIP Police Area Collision Profiles

Area: Dorset, Devon and Cornwall

Dr. Craig Smith and Bruce Walton
Agilysis
March 2021

agilysis

The Royal Automobile Club Foundation for Motoring Ltd is a transport policy and research organisation which explores the economic, mobility, safety and environmental issues relating to roads and their users. The Foundation publishes independent and authoritative research with which it promotes informed debate and advocates policy in the interest of the responsible motorist.

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About the Authors

Dr. Craig Smith is a mathematician, with an established background in academic research. He studied for both his undergraduate master's degree and doctorate in mathematics at the University of Oxford. Since then, he has endeavoured to use his expertise to carry out robust and innovative analysis and research. As Agilysis' Data Scientist, Craig has extensive experience in handling a wide variety of data, and uses his background as a mathematician to explore the use of machine learning and artificial intelligence in advancing road safety research and unlocking the full potential of data.

Bruce Walton has been working with road safety data since 2002, coming from a background in analytical modelling, database design and IT training across several sectors. Since his appointment as project manager for the multi award-winning MAST Online project, Bruce has become recognised as expert in road casualty data, contributory factor analysis, resident risk, analytical architecture and enforcement data management. Bruce works with many road safety stakeholder organisations in the UK, and provides consultancy and training to international projects on road safety data architecture and reporting, such as the International Road Federation's 'World Road Statistics' programme. Bruce is also a member of the government's Standing Committee for Road Accident Statistics (SCRAS) in the UK.

Disclaimer

This report has been prepared for the RAC Foundation by Dr. Craig Smith and Bruce Walton of Agilysis. Any errors or omissions are the author's sole responsibility. The report content reflects the views of the authors and not necessarily those of the RAC Foundation.

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List of Abbreviations

ATS	automatic traffic signal
CF	contributory factor
DfT	Department for Transport
FSC	fatal and serious collision
IMD	Index of Multiple Deprivation
KSI	killed or seriously injured
LSOA	Lower Layer Super Output Area
ONS	Office for National Statistics
RCIP	Road Collision Investigation Project

1 Introduction

This report forms part of the Road Collision Investigation Project (RCIP). The purpose of RCIP is to establish whether there is a business case for putting more resource into the investigation of road crashes – and, if there is, to establish how best to take this forward. The project, implemented by the RAC Foundation with government funding, began in the summer of 2018. [1]

RCIP's aims include developing an analytical framework and protocols and testing them in real-world environments. To address these aims, the RAC Foundation produced a research brief in February 2020. Agilysis successfully bid to undertake this research for three RCIP areas, with work commencing in April 2020. The project sought to apply deep learning models to road safety data to identify collision trends and types in a way which will provide value to the RCIP project.

This report is part of a series which delivers the results of this research. It contains a synthesis of the most significant findings of analysis carried out on data relating to one of the police force areas participating in RCIP. The intention is to test the validity and value of the methodology in a real-world environment.

An overview of RCIP and further explanation of how this report relates to the project is laid out in the accompanying methodology paper. That paper also contains a detailed description of the methodology used, and lessons learnt from the process.

1.1 Delivery

The research addresses these objectives by delivering four key outputs:

- comparator identification;
- trend analysis;
- collision type analysis; and
- synthesis.

The process used to create each of these components is also described in the methodology paper. This report sets out the results for Dorset, Devon and Cornwall Police (hereinafter referred to as DDC). Appendix A includes a summary list of the input variables used, with an indication of how the model applied them when clustering collisions in DDC.

The comparator identification process, and the process used to arrive at it, is described in the methodology paper. This process identified Avon and Somerset Police as the force most comparable to DDC.

The trend analysis has been supplied to RCIP investigators primarily by means of online dashboards. The output from this analysis is extensive; this report contains some synthesised key findings for DDC. The collision type analysis output has been summarised in infographics which are also included in this report.

[1] www.racfoundation.org/collaborations/road-collision-investigation-project

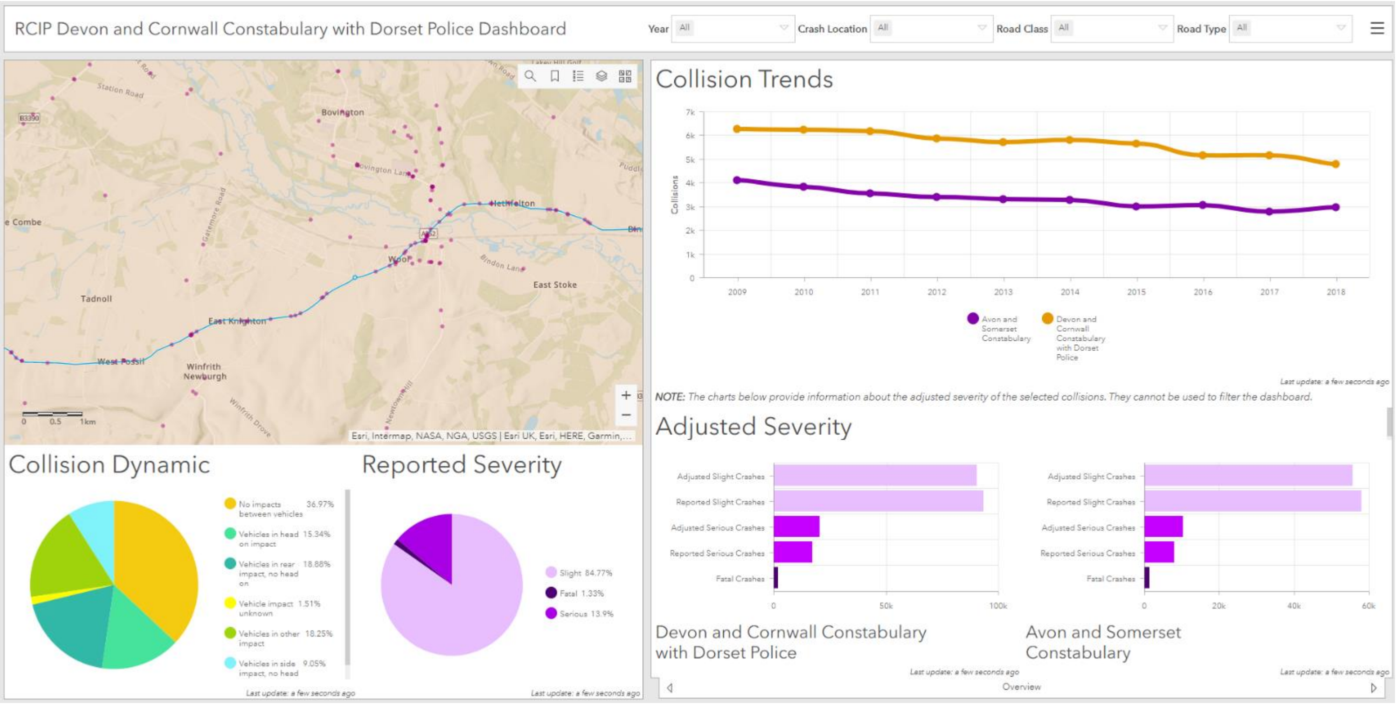
2 Area Profile of Dorset, Devon and Cornwall Police

2.1 Dashboards

Primary delivery of the trend analysis results was through a series of dashboards realised in ArcGIS Online. These dashboards are available to RCIP collision investigators via their logins to CrashMap Pro, an ArcGIS application developed by Agilysis. Figure 2.1 shows an example of the dashboard for DDC, viewing the Collision Trends pane. Collision investigators with access to these credentials can view the dashboard containing results for DDC, as well as the comparator area of Avon and Somerset, at the following URL:

https://agilysis.maps.arcgis.com/apps/opsdashboard/index.html#/04aab30d5d1d4d0b8f20f8ae4d4b73f4

Figure 2.1: Example view of the DDC dashboard



Source: Author's own

The dashboard provides complete interactive access to detailed analysis of all input variables. It allows investigators to filter collisions by any desired combination of variables and locate specific collisions which exhibit them on a map. The filter dropdown controls on the title bar apply overarching filters, which allow the subject and comparator areas to be examined either separately or together for any desired time period and/or road type. Individual collisions which fit the selected criteria can then be readily identified and examined in more detail if required. This allows investigators to view all reported collisions which exhibit a specific combination of characteristics.

The left pane of the dashboard maps all collisions, including those resulting in only slightly injured casualties. Each collision can be selected individually to show its ID (thereby facilitating further investigation of selected incidents in police records) and salient facts such as the number of casualties involved and types of vehicle conflict present. The map is accompanied by two pie charts showing the reported severity and collision dynamics of currently selected collisions. The map can be filtered using four drop down lists, covering year, location by area, class and type.

The right pane of the dashboard can be scrolled through several different views, most of which include multiple interactive controls used for filtering selected collisions (exceptions are noted in the list which follows, and also indicated on the dashboard itself). These controls are based on, but are more extensive in detail than, the input variables used in the cluster analysis. For a listing of all input variables, along with how they were used in the DDC cluster analysis compared to the national analysis described in the methodology paper, see Appendix A.

The panes included in the dashboard, and the controls available on them, are as follows:

- Overview pane (overview charts are for information only, and cannot be used for filtering the map):
    - trends over time of the selected collisions
    - comparative breakdown of recorded severity compared with adjusted severity according to Department for Transport (DfT) record level statistical adjustments which account for discrepancies with injury-based recording systems)
- Location analysis pane:
    - traffic where DfT count point data is available, classified as busy (upper quartile), normal, or quiet (lower quartile)
    - road rurality following ONS classifications of rural, town or urban area
    - road class
    - road type
- Times and days
- Pedestrian collisions:
    - pedestrian casualties by age and deprivation
    - pedestrian movement
- Actors (profile of involved persons):
    - young and older drivers
    - vulnerable vehicles (cycles and horses)
    - deprived drivers (lower quartile of home community Index of Multiple Deprivation (IMD), as defined by the ONS)
    - working drivers
    - hit-and-run drivers
- Casualties by road user type and severity
- Attendant circumstances:
    - weather and light conditions
    - junction types
- Vehicles involved:
    - manoeuvres (overtaking, turning, lane changes and slow traffic)
    - run-offs[2]
    - vehicle type (including motorcycles by size)
- Contributory factor groups, as a Venn diagram (for information only, and cannot be used for filtering the map):
    - environmental factors (100, 700 and 900 series)
    - driver and vehicle factors (200–600 series)
    - pedestrian (800 series)
- Contributory factor groups, as a bar chart (for information only, and cannot be used for filtering the map)
- Driver contributory factors, by vehicle type
- Driver contributory factors, by manoeuvre type

[2] Run-off-road collisions, referred to as 'run-offs' in this report, are collisions during which any involved vehicle leaves the carriageway, even if it later re-joins it.

3 Results of Collision Type Analysis

The process used to identify clusters of collisions which have characteristics in common is described in detail in the accompanying methodology paper. For DDC, these groups were arranged subjectively into seven overarching groups, then the clusters within each group were organised into families within which sibling clusters could be identified on the basis of the characteristics they shared.

3.1 How to read the cluster diagrams

The clusters in each group are shown by the following diagrams. In each diagram:

- each coloured area shows a family of collisions within the group that have been grouped together based on similar characteristics;
- each of the inner boxes within that family represents sibling or 'Grandsibling' clusters that divide up these shared characteristics down to another level of separation; and
- all collision totals are additive, so percentages are based on the overall total for the entire group (and may not add up to 100% due to rounding).
- The key for the associated meanings represented by each infographic within the diagrams can be found in Appendix B.

3.2 Collisions involving pedestrian casualties

3.2.1 Cluster list

Table 3.1 summarises all clusters in this group textually. Each row represents a cluster which is coloured to show which family they belong to (with family title shown in the first column); the Sibling (and sometimes GrandSibling) columns show the additional variables which characterise that particular cluster.

Table 3.1: Textual summary of clusters, collisions involving pedestrian casualties

Family	Sibling	GrandSibling	Cluster ID	Count	Cluster FSCs as % of group
Pedestrian casualty, pedestrian contributory factor (CF), single vehicle			DDC22	2,706	33.1%
Pedestrian casualty, pedestrian CF, single vehicle	Single vehicle, young driver		DDC50	469	5.7%
Pedestrian casualty, pedestrian CF, single vehicle	Night (streetlights)		DDC15	1,154	14.1%
Pedestrian casualty, pedestrian CF, single vehicle	Night (streetlights)	Uncontrolled junction	DDC30	381	4.7%
Pedestrian casualty, pedestrian CF, single vehicle	Night (streetlights)	Uncontrolled junction, young driver	DDC57	100	1.2%
Pedestrian casualty, pedestrian CF, single vehicle	Uncontrolled junction		DDC32	1,449	17.7%

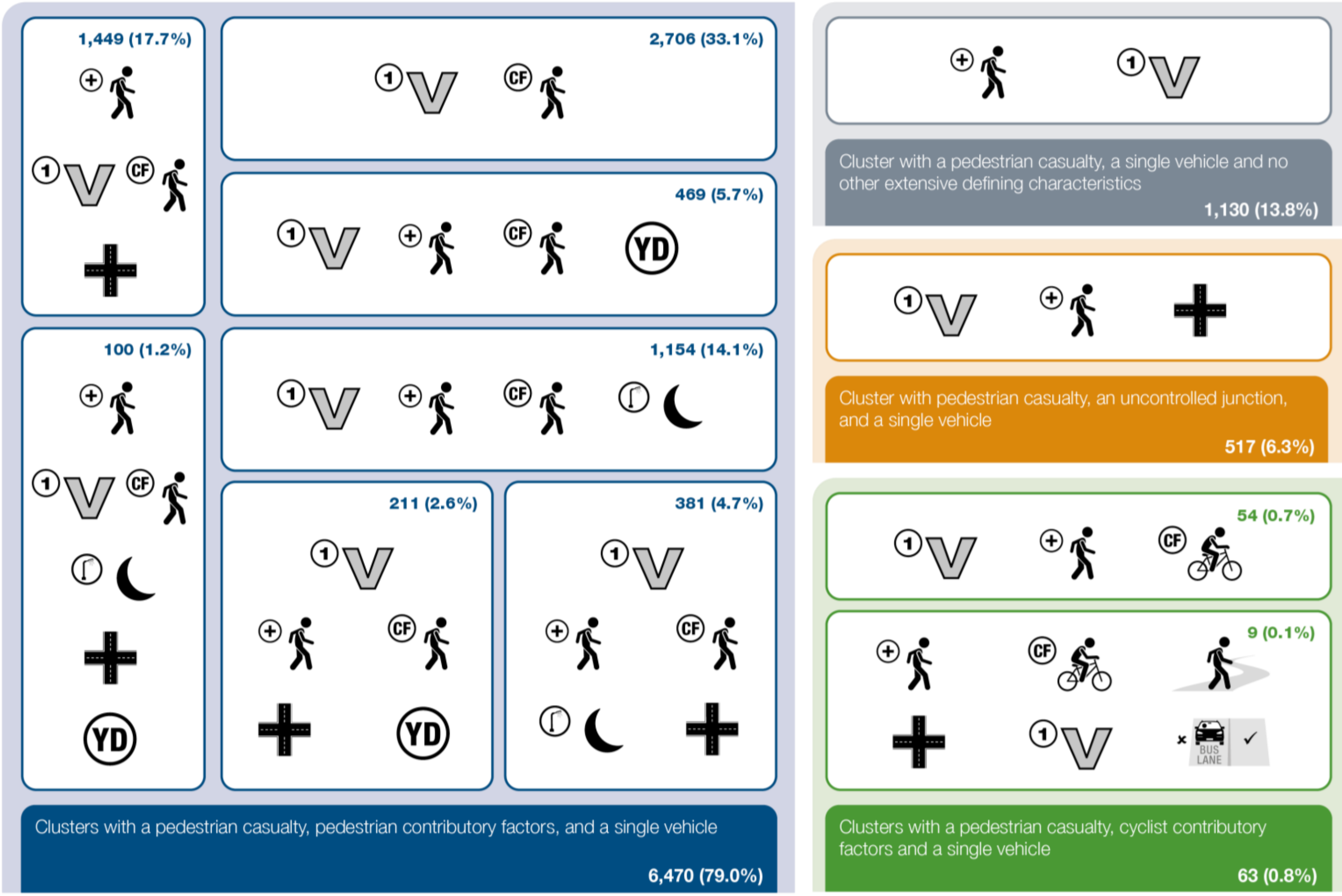
Pedestrian casualty, pedestrian CF, single vehicle	Uncontrolled junction	Young driver	DDC42	211	2.6%
Pedestrian casualty, single vehicle			DDC25	1,130	13.8%
Pedestrian casualty, single vehicle, uncontrolled junction			DDC13	517	6.3%
Pedestrian casualty, single vehicle, cyclist CF			DDC60	54	0.7%
Pedestrian casualty, single vehicle, cyclist CF	Pedestrian footway, uncontrolled junction, vehicle not in carriageway		DDC55	9	0.1%

Source: Author's own

3.2.2 Cluster infographic

Figure 3.1 summarises all clusters in this group diagrammatically.

Figure 3.1: Cluster family diagram, collisions involving pedestrian casualties

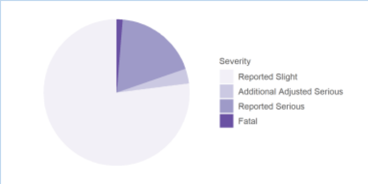
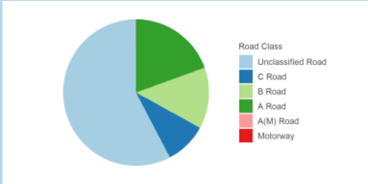
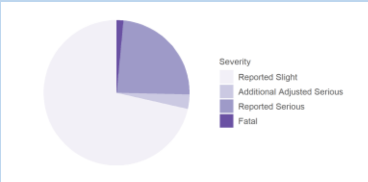
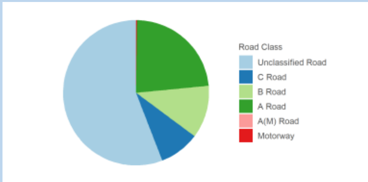
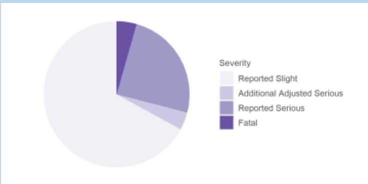
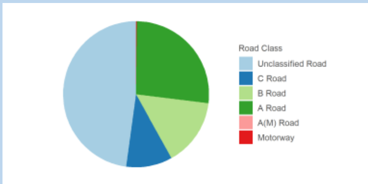
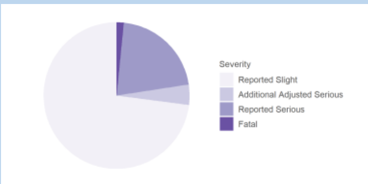
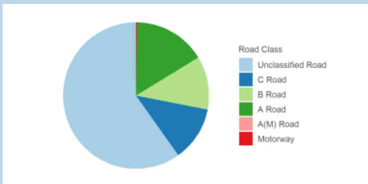
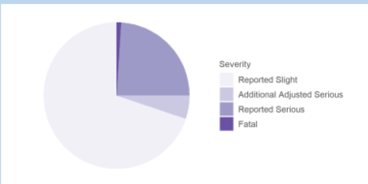
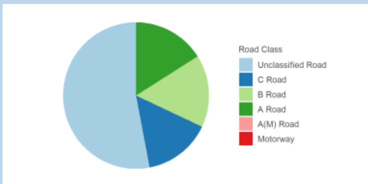


Source: Author's own

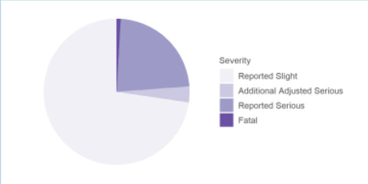
3.2.3 Cluster details

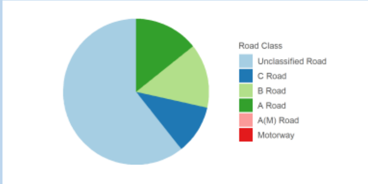
Table 3.2 summarises the most salient clusters in this group by severity and road class.

Table 3.2: Summary of clusters by severity and road class, collisions involving pedestrian casualties

	Collisions involving pedestrian casualties
DDC22	**Pedestrian casualty, pedestrian contributory factor (CF), single vehicle**
All collisions	**Percentage adjusted fatal and serious collisions (FSCs)**
2,706	33.1%
	
DDC50	**Pedestrian casualty, pedestrian CF, single vehicle, young driver**
All collisions	**Percentage adjusted FSCs**
469	5.7%
	
DDC15	**Pedestrian casualty, pedestrian CF, single vehicle, night (streetlights)**
All collisions	**Percentage adjusted FSCs**
1,154	14.1%
	
DDC30	**Pedestrian casualty, pedestrian CF, single vehicle, night (streetlights), uncontrolled junction**
All collisions	**Percentage adjusted FSCs**
381	4.7%
	
DDC57	**Pedestrian casualty, pedestrian CF, single vehicle, night (streetlights), uncontrolled junction, young driver**
All collisions	**Percentage adjusted FSCs**
100	1.2%
	
DDC32	**Pedestrian casualty, pedestrian CF, single vehicle, uncontrolled junction**
All collisions	**Percentage adjusted FSCs**

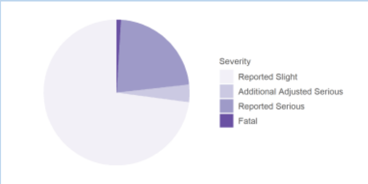
All collisions	Percentage adjusted FSCs
1,449	17.7%

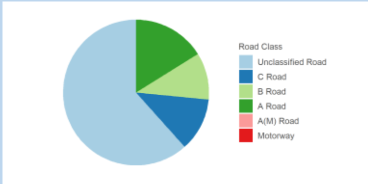




DDC42 — **Pedestrian casualty, pedestrian CF, single vehicle, uncontrolled junction, young driver**

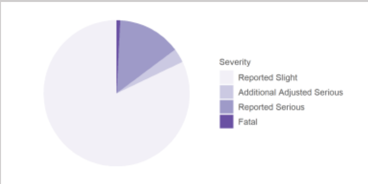
All collisions	Percentage adjusted FSCs
211	2.6%

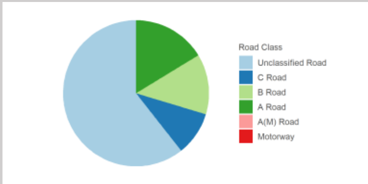




DDC25 — **Pedestrian casualty, single vehicle**

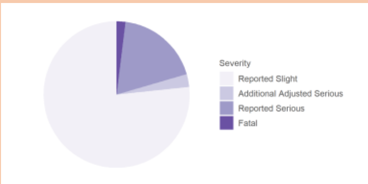
All collisions	Percentage adjusted FSCs
1,130	13.8%

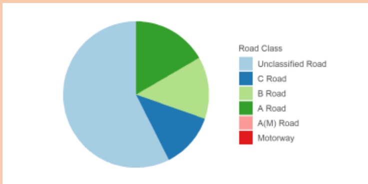




DDC13 — **Pedestrian casualty, single vehicle, uncontrolled junction**

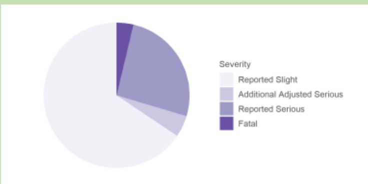
All collisions	Percentage adjusted FSCs
517	6.3%

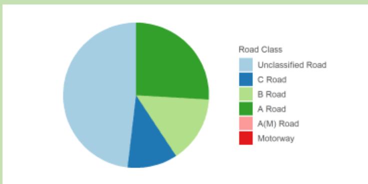




DDC60 — **Pedestrian casualty, single vehicle, cyclist CF**

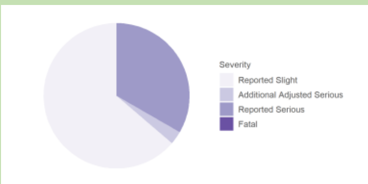
All collisions	Percentage adjusted FSCs
54	0.7%

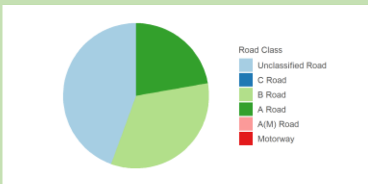




DDC55 — **Pedestrian casualty, single vehicle, cyclist CF, pedestrian footway, uncontrolled junction, vehicle not in carriageway**

All collisions	Percentage adjusted FSCs
9	0.1%





Source: Author's own

3.3 Collisions involving cyclist casualties

3.3.1 Cluster list

Table 3.3 summarises all clusters in this group textually.

Table 3.3: Textual summary of clusters, collisions involving cyclist casualties

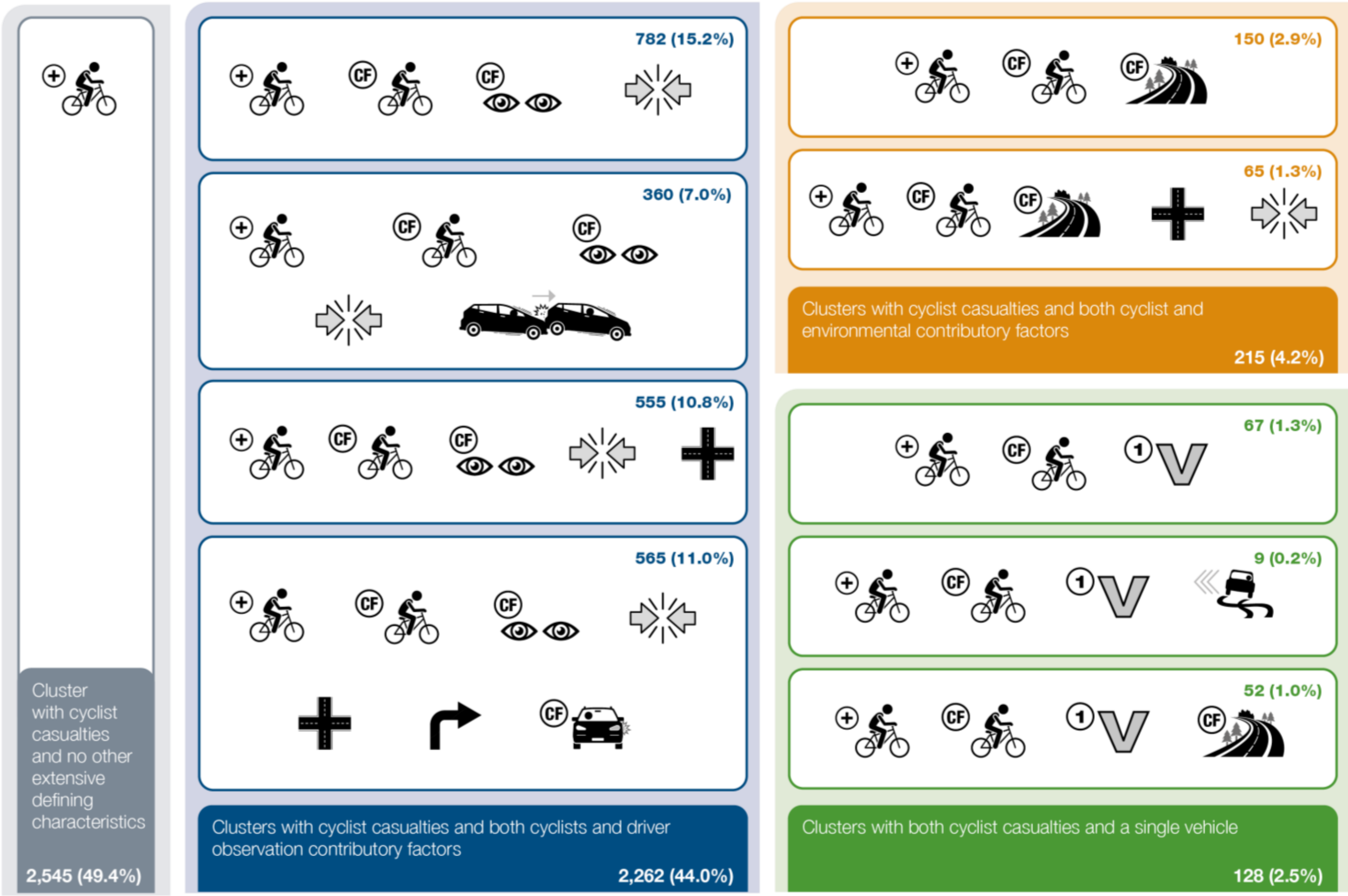
Family	Sibling	GrandSibling	Cluster ID	Count	Cluster FSCs as % of group
Cyclist casualty, not clustered further			DDC27	2,545	49.4%
Cyclist contributory factor (CF), driver observation CF, other impact			DDC11	782	15.2%
Cyclist CF, driver observation CF, other impact	Shunt		DDC52	360	7.0%
Cyclist CF, driver observation CF, other impact	Uncontrolled junction		DDC43	555	10.8%
Cyclist CF, driver observation CF, other impact	Uncontrolled junction	Right turn, driver turning CF	DDC41	565	11.0%
Cyclist CF, environment CF			DDC59	150	2.9%
Cyclist CF, environment CF	Uncontrolled junction, other impact		DDC54	65	1.3%
Cyclist CF, single vehicle			DDC53	67	1.3%
Cyclist CF, single vehicle	Environment CF		DDC63	52	1.0%
Cyclist CF, single vehicle	Runoff (nearside)		DDC65	9	0.2%

Source: Author's own

3.3.2 Cluster infographic

Figure 3.2 summarises all clusters in this group diagrammatically.

Figure 3.2: Cluster family diagram, collisions involving cyclist casualties

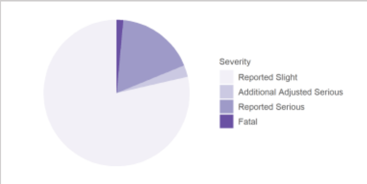
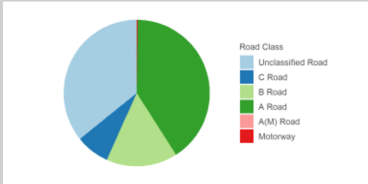
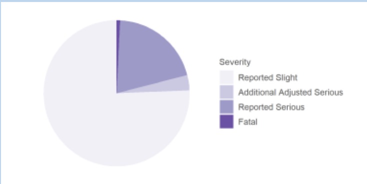
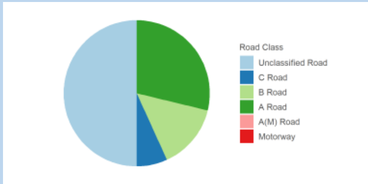
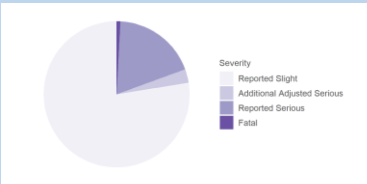
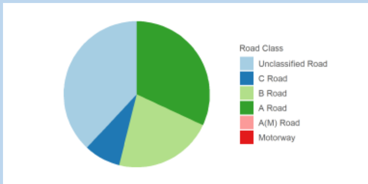
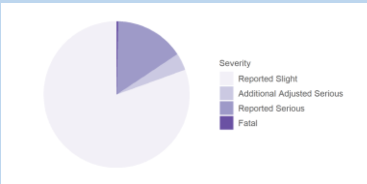
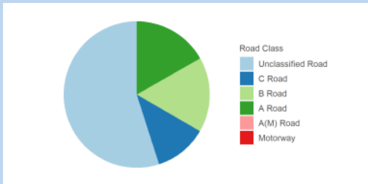
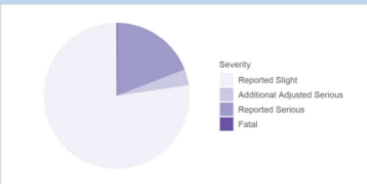
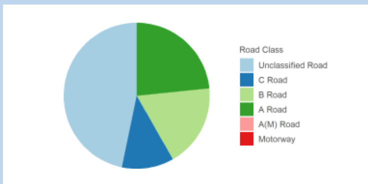


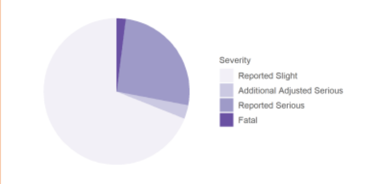
Source: Author's own

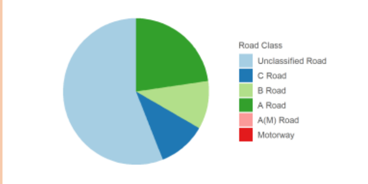
3.3.3 Cluster details

Table 3.4 summarises the most salient clusters in this group by severity and road class.

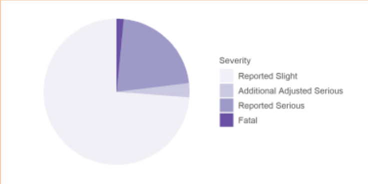
Table 3.4: Summary of clusters by severity and road class, collisions involving cyclist casualties

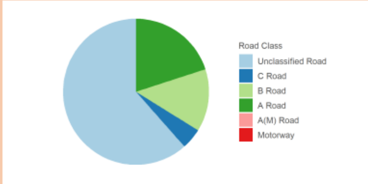
	Collisions involving cyclist casualties	
DDC27	**Cyclist casualty**	
	All collisions	**Percentage adjusted fatal and serious collisions (FSCs)**
	2,545	49.4%
		
DDC11	**Cyclist casualty, cyclist contributory factor (CF,) driver observation CF, other impact**	
	All collisions: 782	**Percentage adjusted FSCs:** 15.2%
		
DDC52	**Cyclist casualty, cyclist CF, driver observation CF, shunt, other impact**	
	All collisions: 360	**Percentage adjusted FSCs:** 7.0%
		
DDC43	**Cyclist casualty, cyclist CF, uncontrolled junction, driver observation CF, other impact**	
	All collisions: 555	**Percentage adjusted FSCs:** 10.8%
		
DDC41	**Cyclist casualty, cyclist CF, uncontrolled junction, driver observation CF, other impact, right turn, driver turning CF**	
	All collisions: 565	**Percentage adjusted FSCs:** 11.0%
		
DDC59	**Cyclist casualty, cyclist CF, environment CF**	
	All collisions: 150	**Percentage adjusted FSCs:** 2.9%



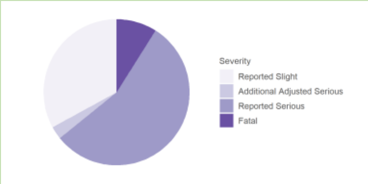


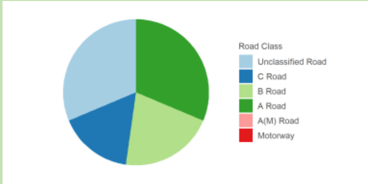
DDC54	Cyclist casualty, cyclist CF, environment CF, uncontrolled junction, other impact
All collisions: 65	**Percentage adjusted FSCs:** 1.3%



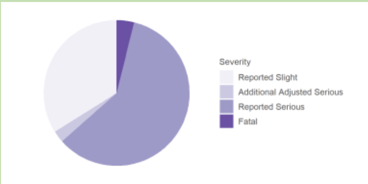


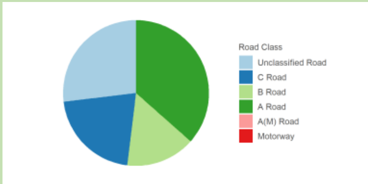
DDC53	Cyclist casualty, cyclist CF, single vehicle
All collisions: 67	**Percentage adjusted FSCs:** 1.3%





DDC63	Cyclist casualty, cyclist CF, environment CF, single vehicle
All collisions: 52	**Percentage adjusted FSCs:** 1.0%





Source: Author’s own

3.4 Single-vehicle collisions

3.4.1 Cluster list

Table 3.5 summarises all clusters in this group textually.

Table 3.5: Textual summary of clusters, single-vehicle collisions

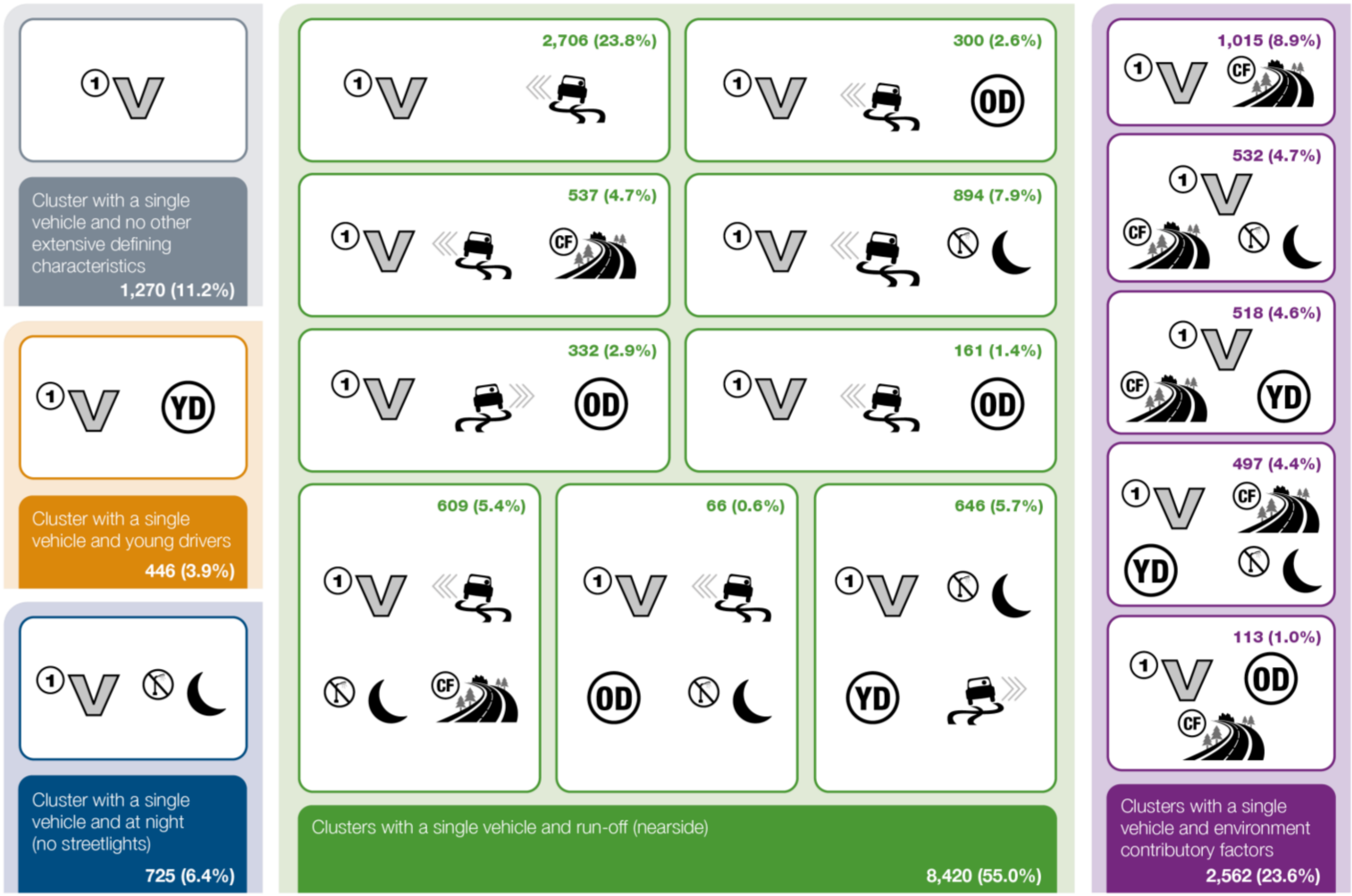
Family	Sibling	GrandSibling	Cluster ID	Count	Cluster FSCs as % of group
Single vehicle, not clustered further			DDC34	1,270	11.2%
Single vehicle, young driver			DDC47	446	3.9%
Single vehicle, night (no streetlights)			DDC39	725	6.4%
Single vehicle, runoff (nearside)			DDC24	2,706	23.8%
Single vehicle, runoff (nearside)	Environment contributory factor (CF)		DDC36	537	4.7%
Single vehicle, runoff (nearside)	Night (no streetlights)		DDC29	894	7.9%
Single vehicle, runoff (nearside)	Night (no streetlights)	Environment CF	DDC35	609	5.4%
Single vehicle, runoff (nearside)	Older driver		DDC61	161	1.4%
Single vehicle, runoff (nearside)	Older driver	Environment CF	DDC58	66	0.6%
Single vehicle, runoff (nearside)	Older driver		DDC3	332	2.9%
Single vehicle, runoff (nearside)	Young driver		DDC51	300	2.6%
Single vehicle, runoff (nearside)	Young driver, night (no streetlights)		DDC28	646	5.7%
Single vehicle, environment CF			DDC1	1,015	8.9%
Single vehicle, environment CF	Night (no streetlights)		DDC44	532	4.7%
Single vehicle, environment CF	Older driver		DDC64	113	1.0%
Single vehicle, environment CF	Young driver		DDC40	518	4.6%
Single vehicle, environment CF	Young driver	Night (no streetlights)	DDC14	497	4.4%

Source: Author's own

3.4.2 Cluster infographic

Figure 3.3 summarises all clusters in this group diagrammatically.

Figure 3.3: Cluster family diagram, single-vehicle collisions

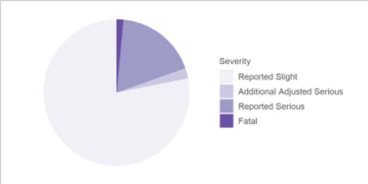
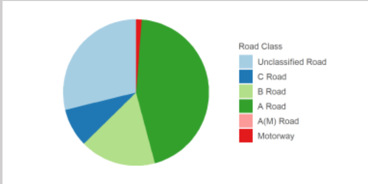
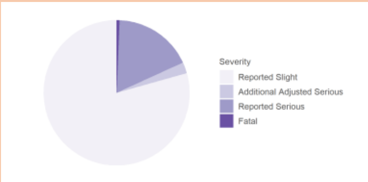
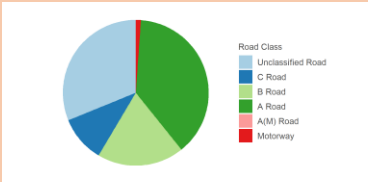
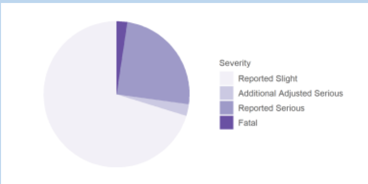
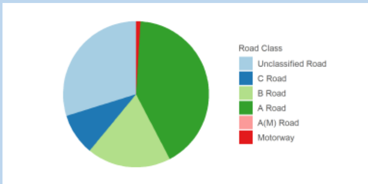
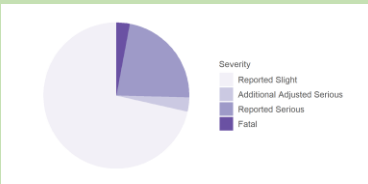
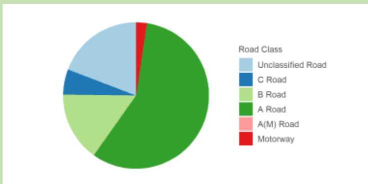
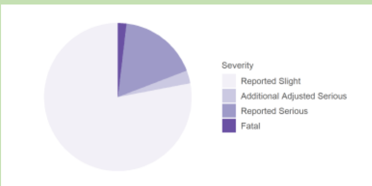
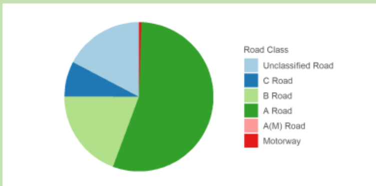


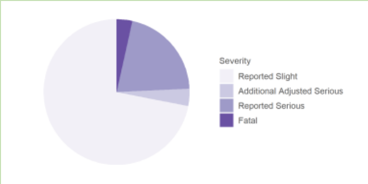
Source: Author's own

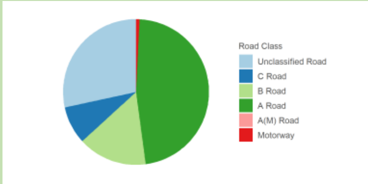
3.4.3 Cluster details

Table 3.6 summarises the most salient clusters in this group by severity and road class.

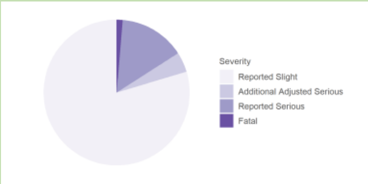
Table 3.6: Summary of clusters by severity and road class, single-vehicle collisions

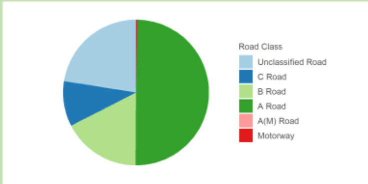
<table>
<tr><th></th><th>Single-vehicle collisions</th></tr>
<tr><td>DDC34</td><td>Single vehicle</td></tr>
<tr><td>All collisions</td><td>Percentage adjusted fatal and serious collisions (FSCs)</td></tr>
<tr><td>1,270</td><td>11.2%</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>DDC47</td><td>Single vehicle, young driver</td></tr>
<tr><td>All collisions</td><td>Percentage adjusted FSCs</td></tr>
<tr><td>446</td><td>3.9%</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>DDC39</td><td>Single vehicle, night (no streetlights)</td></tr>
<tr><td>All collisions</td><td>Percentage adjusted FSCs</td></tr>
<tr><td>725</td><td>6.4%</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>DDC24</td><td>Single vehicle, runoff (nearside)</td></tr>
<tr><td>All collisions</td><td>Percentage adjusted FSCs</td></tr>
<tr><td>2,706</td><td>23.8%</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>DDC36</td><td>Single vehicle, runoff (nearside), environment contributory factor (CF)</td></tr>
<tr><td>All collisions</td><td>Percentage adjusted FSCs</td></tr>
<tr><td>537</td><td>4.7%</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>DDC29</td><td>Single vehicle, night (no streetlights), runoff (nearside)</td></tr>
<tr><td>All collisions</td><td>Percentage adjusted FSCs</td></tr>
<tr><td>894</td><td>7.9%</td></tr>
</table>



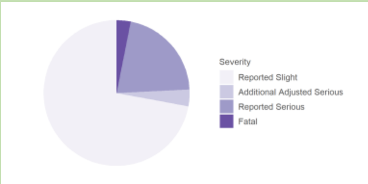


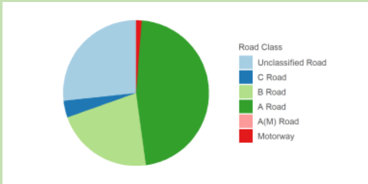
DDC35	Single vehicle, night (no streetlights), environment CF, runoff (nearside)
All collisions	**Percentage adjusted FSCs**
609	5.4%



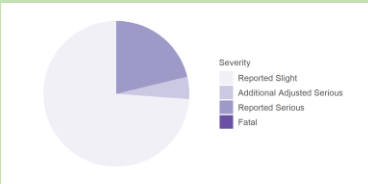


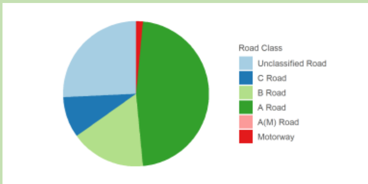
DDC61	Single vehicle, older driver, runoff (nearside)
All collisions	**Percentage adjusted FSCs**
161	1.4%



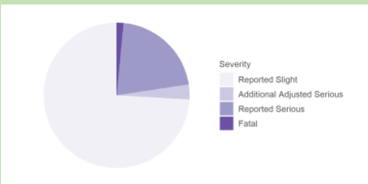


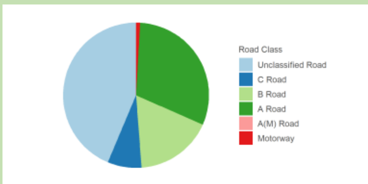
DDC58	Single vehicle, older driver, runoff (nearside), environment CF
All collisions	**Percentage adjusted FSCs**
66	0.6%



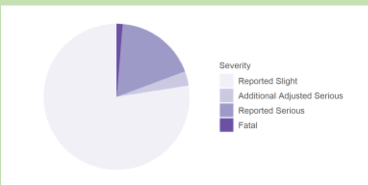


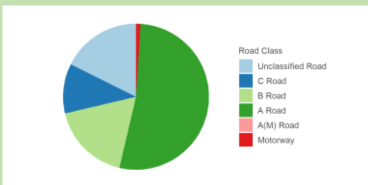
DDC3	Single vehicle, older driver, runoff (other)
All collisions	**Percentage adjusted FSCs**
332	2.9%



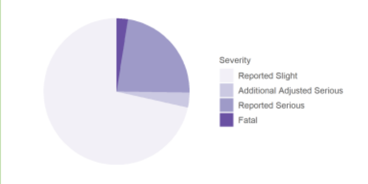


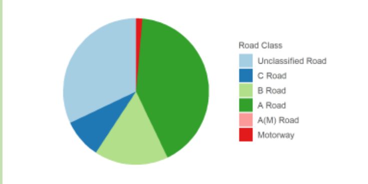
DDC51	Single vehicle, young driver, runoff (nearside)
All collisions	**Percentage adjusted FSCs**
300	2.6%





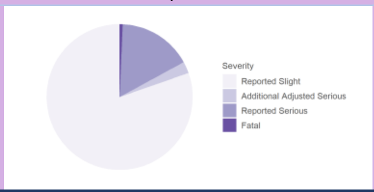
DDC28	Single vehicle, young driver, runoff (other), night (no streetlights)
All collisions	**Percentage adjusted FSCs**
646	5.7%

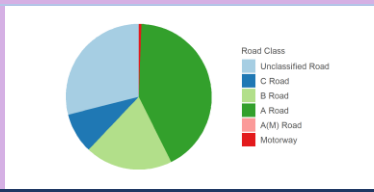




DDC1 **Single vehicle, environment CF**

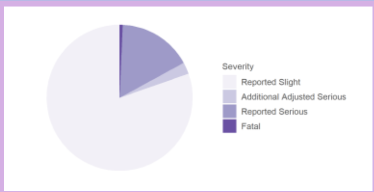
All collisions	Percentage adjusted FSCs
1,015	8.9%

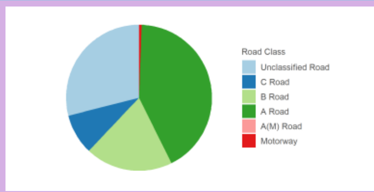




DDC64 **Single vehicle, environment CF**

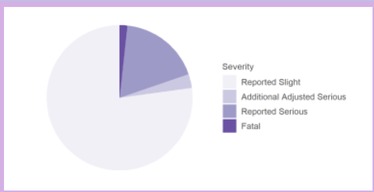
All collisions	Percentage adjusted FSCs
113	1.0%

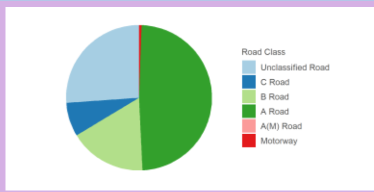




DDC44 **Single vehicle, night (no streetlights), environment CF**

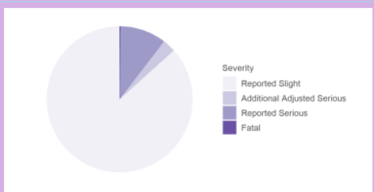
All collisions	Percentage adjusted FSCs
532	4.7%

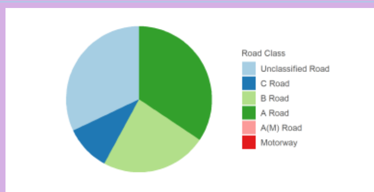




DDC40 **Single vehicle, young driver, environment CF**

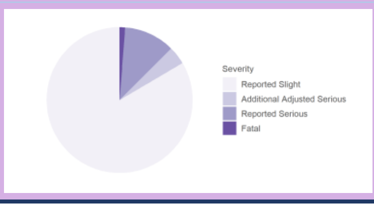
All collisions	Percentage adjusted FSCs
518	4.6%

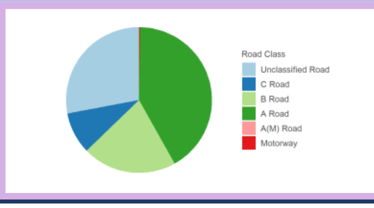




DDC14 **Single vehicle, young driver, environment CF, night (no streetlights)**

All collisions	Percentage adjusted FSCs
497	4.4%





Source: Author’s own

3.5 Collisions involving turning

3.5.1 Cluster list

Table 3.7 summarises all clusters in this group textually.

Table 3.7: Textual summary of clusters, collisions involving turning

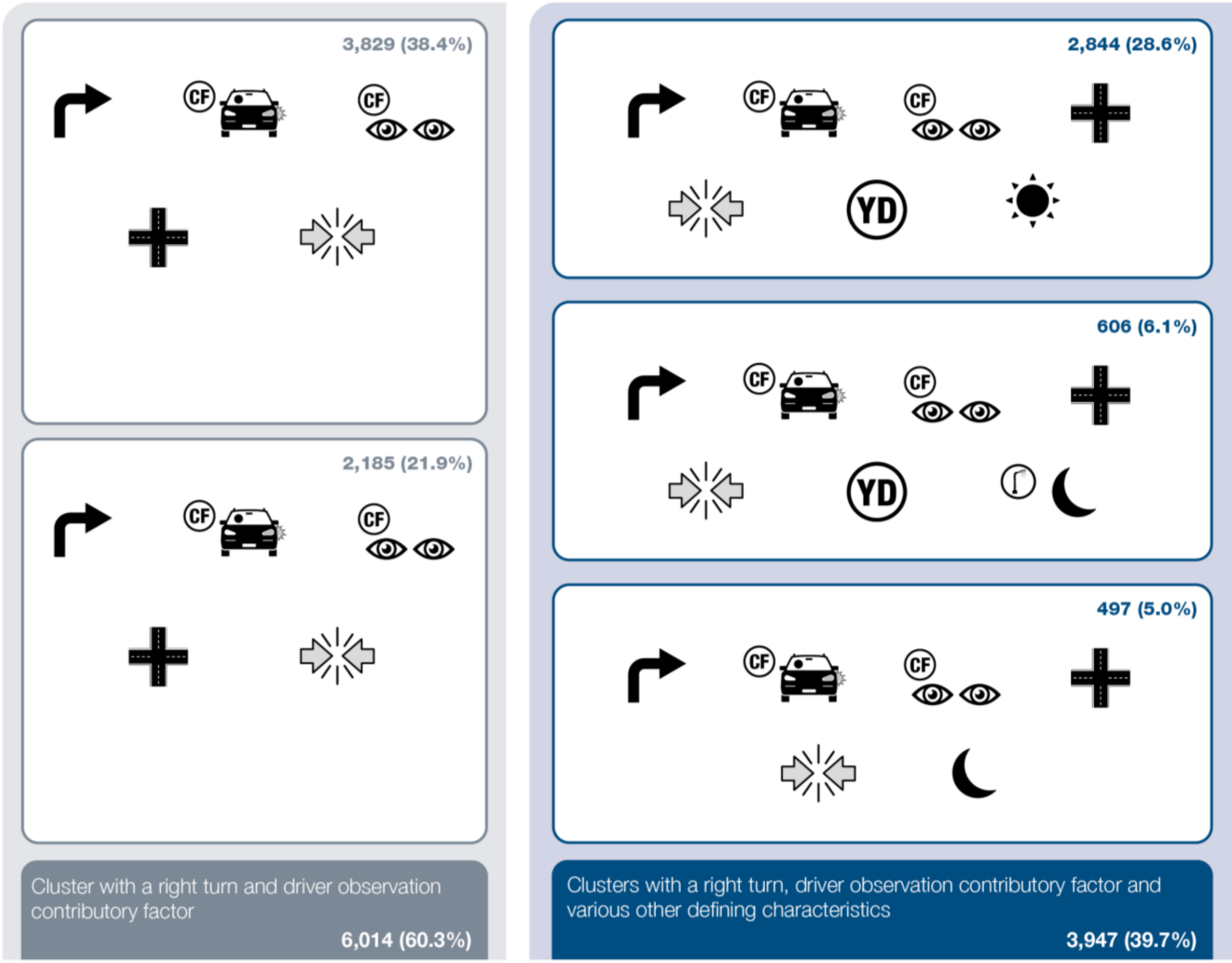
Family	Sibling	GrandSibling	Cluster ID	Count	Cluster FSCs as % of group
Right turn, driver turning contributory factor (CF), driver observation CF, uncontrolled junction, other impact			DDC6	3,829	38.4%
Right turn, driver turning CF, driver observation CF, uncontrolled junction, other impact			DDC12	2,185	21.9%
Right turn, driver turning CF, driver observation CF, uncontrolled junction, other impact	Young driver, day		DDC17	2,844	28.6%
Right turn, driver turning CF, driver observation CF, uncontrolled junction, other impact	Young driver, night (streetlights)		DDC46	606	6.1%
Right turn, driver turning CF, driver observation CF, uncontrolled junction, other impact	Night		DDC26	497	5.0%

Source: Author's own

3.5.2 Cluster infographic

Figure 3.4 summarises all clusters in this group diagrammatically.

Figure 3.4: Cluster family diagram, collisions involving turning

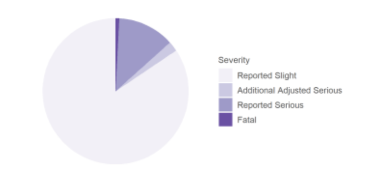
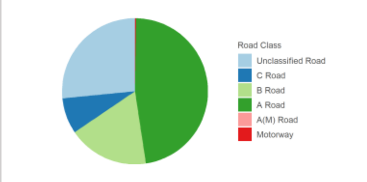
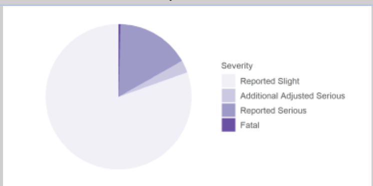
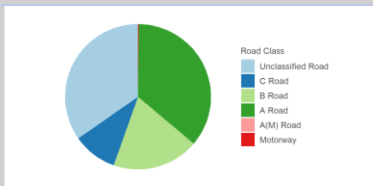
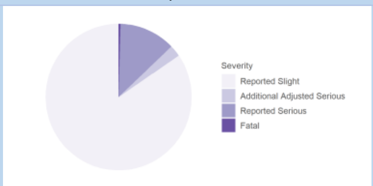
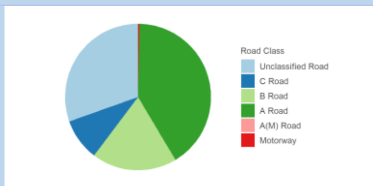
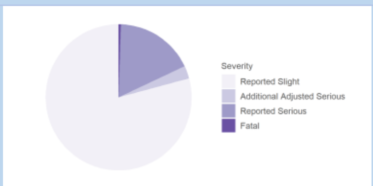
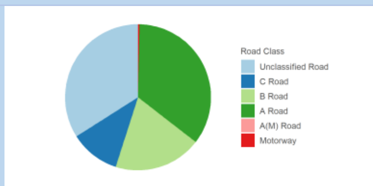
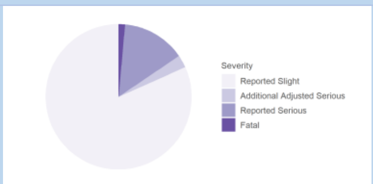
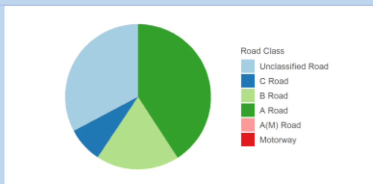


Source: Author's own

3.5.3 Cluster details

Table 3.8 summarises the most salient clusters in this group by severity and road class.

Table 3.8: Summary of clusters by severity and road class, collisions involving turning

	Collisions involving turning
DDC6	**Right turn, driver turning contributory factor (CF), driver observation CF, uncontrolled junction, other impact**
All collisions	**Percentage adjusted fatal and serious collisions (FSCs)**
3,829	38.4%
	
DDC12	**Right turn, driver turning CF, driver observation CF, uncontrolled junction, other impact**
All collisions	**Percentage adjusted FSCs**
2,185	21.9%
	
DDC17	**Right turn, driver turning CF, driver observation CF, uncontrolled junction, other impact, young driver, day**
All collisions	**Percentage adjusted FSCs**
2,844	28.6%
	
DDC46	**Right turn, driver turning CF, driver observation CF, uncontrolled junction, other impact, young driver, night (streetlights)**
All collisions	**Percentage adjusted FSCs**
606	6.1%
	
DDC26	**Right turn, driver turning CF, driver observation CF, uncontrolled junction, other impact, night**
All collisions	**Percentage adjusted FSCs**
497	5.0%
	

Source: Author's own

3.6 Collisions involving environment contributory factors

3.6.1 Cluster list

Table 3.9 summarises all clusters in this group textually.

Table 3.9: Textual summary of clusters, collisions involving environment contributory factors

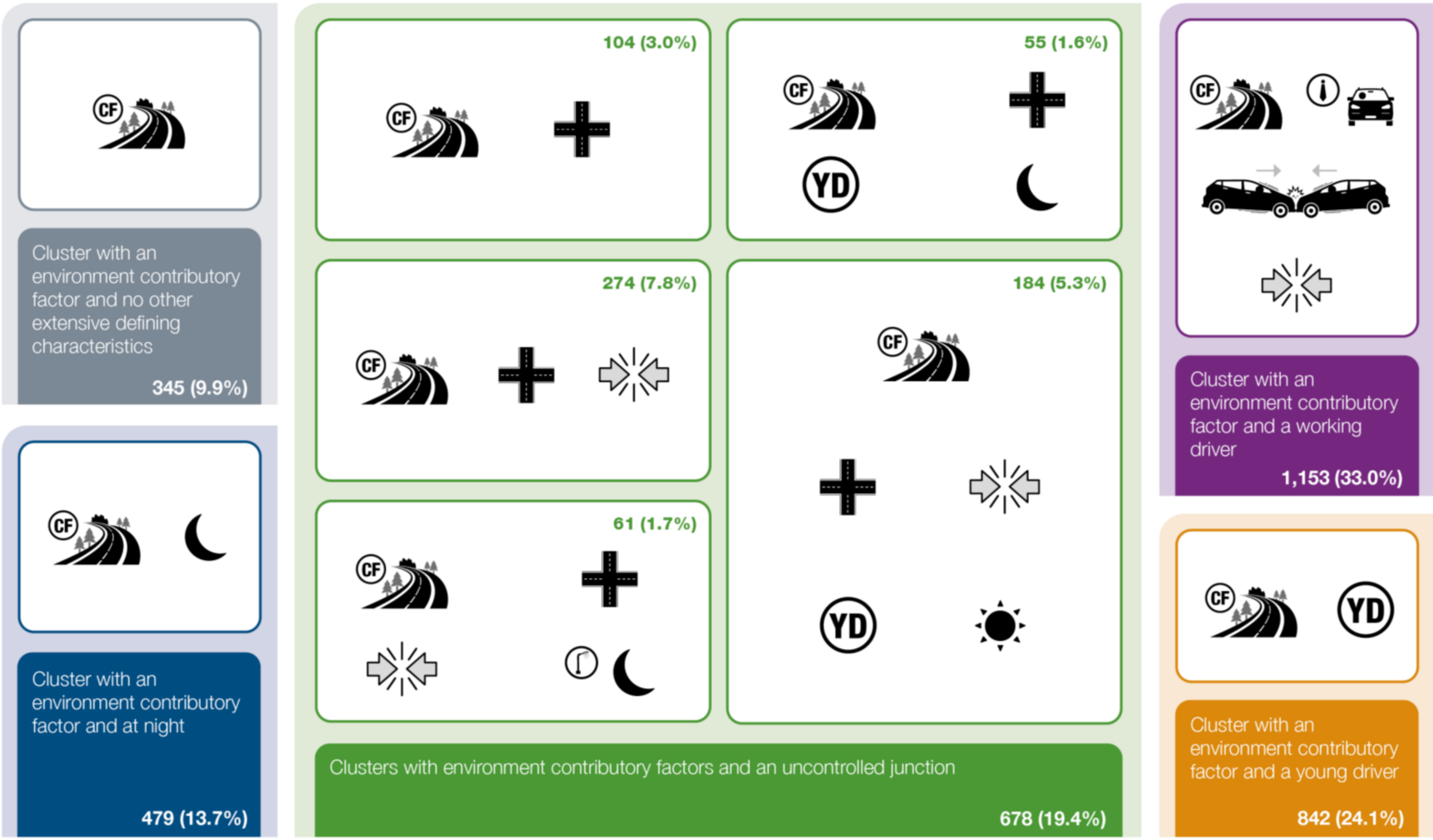
Family	Sibling	GrandSibling	Cluster ID	Count	Cluster FSCs as % of group
Environment contributory factor (CF), not clustered further			DDC38	345	9.9%
Environment CF, night			DDC45	479	13.7%
Environment CF, uncontrolled junction			DDC62	104	3.0%
Environment CF, uncontrolled junction	Other impact		DDC2	274	7.8%
Environment CF, uncontrolled junction	Young driver, night		DDC56	55	1.6%
Environment CF, uncontrolled junction	Young driver, day, other impact		DDC31	184	5.3%
Environment CF, uncontrolled junction	Night (streetlights)		DDC48	61	1.7%
Environment CF, working driver, head on, other impact			DDC18	1,153	33.0%
Environment CF, young driver			DDC23	842	24.1%

Source: Author's own

3.6.2 Cluster infographic

Figure 3.5 summarises all clusters in this group diagrammatically.

Figure 3.5: Cluster family diagram, collisions involving environment contributory factors

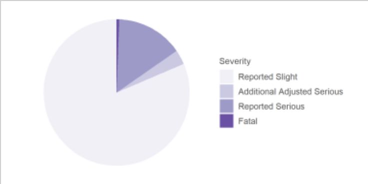
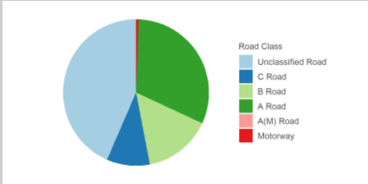
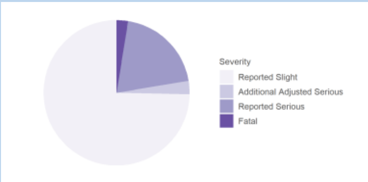
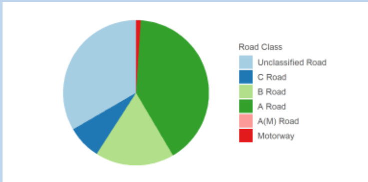
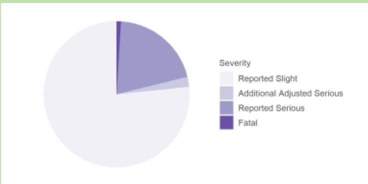
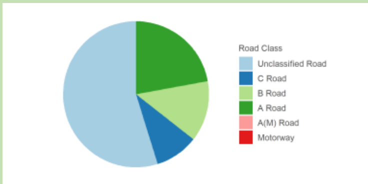
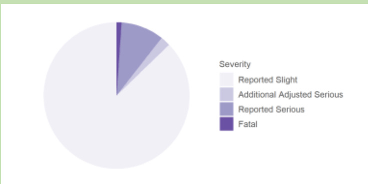
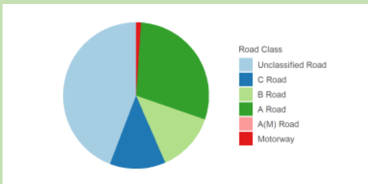
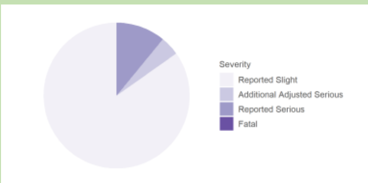
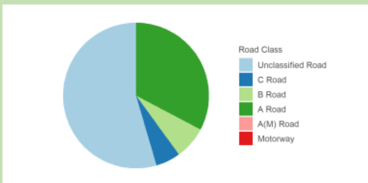


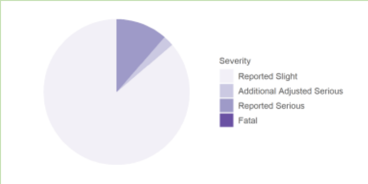
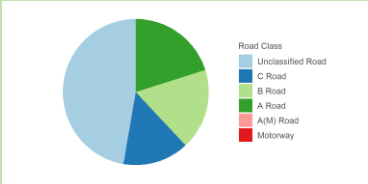
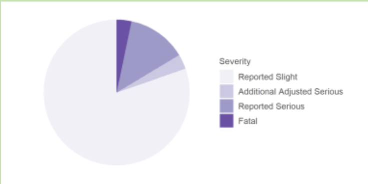
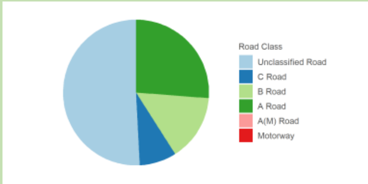
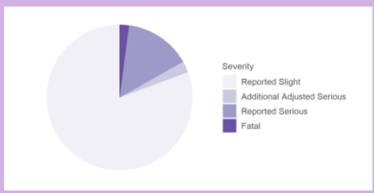
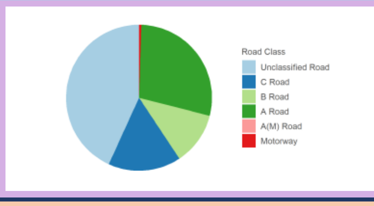
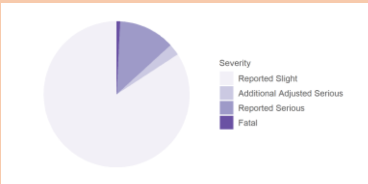
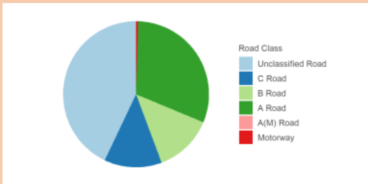
Source: Author's own

3.6.3 Cluster details

Table 3.10 summarises the most salient clusters in this group by severity and road class.

Table 3.10: Summary of clusters by severity and road class, collisions involving environment contributory factors

	Collisions involving environment contributory factors (CFs)
DDC38	**Environment CF**
All collisions	**Percentage adjusted fatal and serious collisions (FSCs)**
345	9.9%
	
DDC45	**Environment CF, night**
All collisions	**Percentage adjusted FSCs**
479	13.7%
	
DDC62	**Environment CF, uncontrolled junction**
All collisions	**Percentage adjusted FSCs**
104	3.0%
	
DDC2	**Environment CF, uncontrolled junction, other impact**
All collisions	**Percentage adjusted FSCs**
274	7.8%
	
DDC56	**Environment CF, uncontrolled junction, young driver, night**
All collisions	**Percentage adjusted FSCs**
55	1.6%
	
DDC31	**Environment CF, uncontrolled junction, young driver, day, other impact**
All collisions	**Percentage adjusted FSCs**
184	5.3%

	
DDC48	**Environment CF, uncontrolled junction, night (streetlights)**
All collisions	**Percentage adjusted FSCs**
61	1.7%
	
DDC18	**Environment CF, working driver, head on, other impact**
All collisions	**Percentage adjusted FSCs**
1,153	33.0%
	
DDC23	**Environment CF, young driver**
All collisions	**Percentage adjusted FSCs**
842	24.1%
	

Source: Author's own

3.7 Collisions involving shunts

3.7.1 Cluster list

Table 3.11 summarises all clusters in this group textually.

Table 3.11: Textual summary of clusters, collisions involving shunts

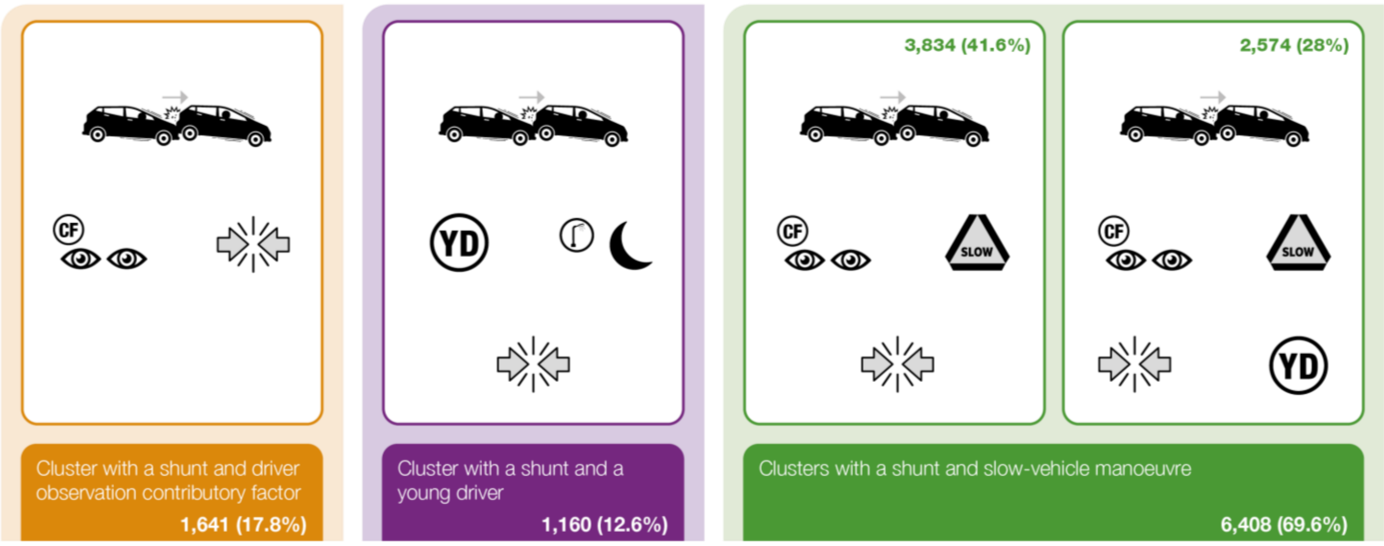
Family	Sibling	GrandSibling	Cluster ID	Count	Cluster FSCs as % of group
Shunt, driver observation contributory factor (CF), other impact			DDC49	1,641	17.8%
Shunt, young driver, night (streetlights), other impact			DDC33	1,160	12.6%
Shunt, driver observation CF, slow-vehicle manoeuvre, other impact			DDC7	3,834	41.6%
Shunt, driver observation CF, slow-vehicle manoeuvre, other impact	Young driver		DDC5	2,574	28.0%

Source: Author's own

3.7.2 Cluster infographic

Figure 3.6 summarises all clusters in this group diagrammatically.

Figure 3.6: Cluster family diagram, collisions involving shunts

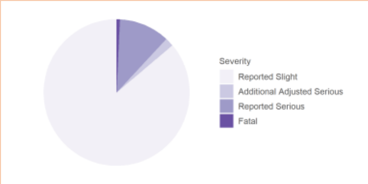
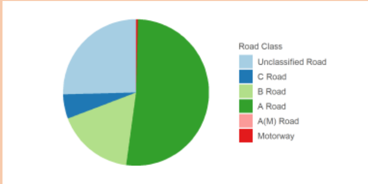
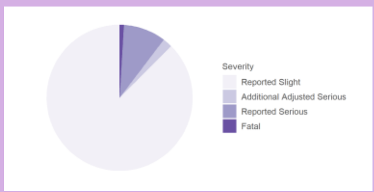
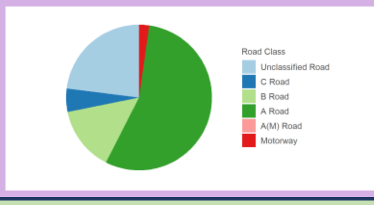
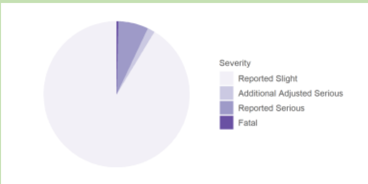
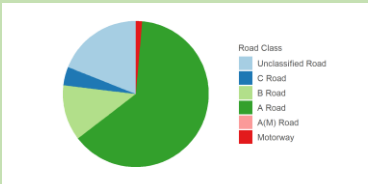
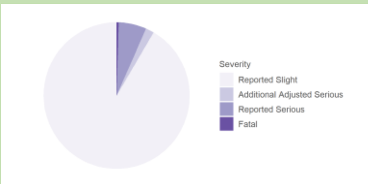
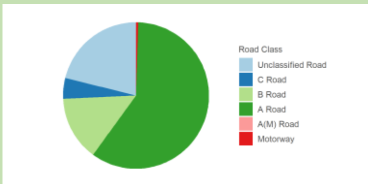


Source: Author's own

3.7.3 Cluster details

Table 3.12 summarises the most salient clusters in this group by severity and road class.

Table 3.12: Summary of clusters by severity and road class, collisions involving shunts

	Collisions involving shunts	
DDC49	**Shunt, driver observation contributory factor (CF), other impact**	
All collisions		**Percentage adjusted fatal and serious collisions (FSCs)**
1,641		17.8%
		
DDC33	**Shunt, young driver, night (streetlights), other impact**	
All collisions		**Percentage adjusted FSCs**
1,160		12.6%
		
DDC7	**Shunt, driver observation CF, slow-vehicle manoeuvre, other impact**	
All collisions		**Percentage adjusted FSCs**
3,834		41.6%
		
DDC5	**Shunt, driver observation CF, slow-vehicle manoeuvre, other impact, young driver**	
All collisions		**Percentage adjusted FSCs**
2,574		28.0%
		

Source: Author's own

3.8 Other collisions

3.8.1 Cluster list

Table 3.13 summarises all clusters in this group textually.

Table 3.13: Textual summary of clusters, all other collisions

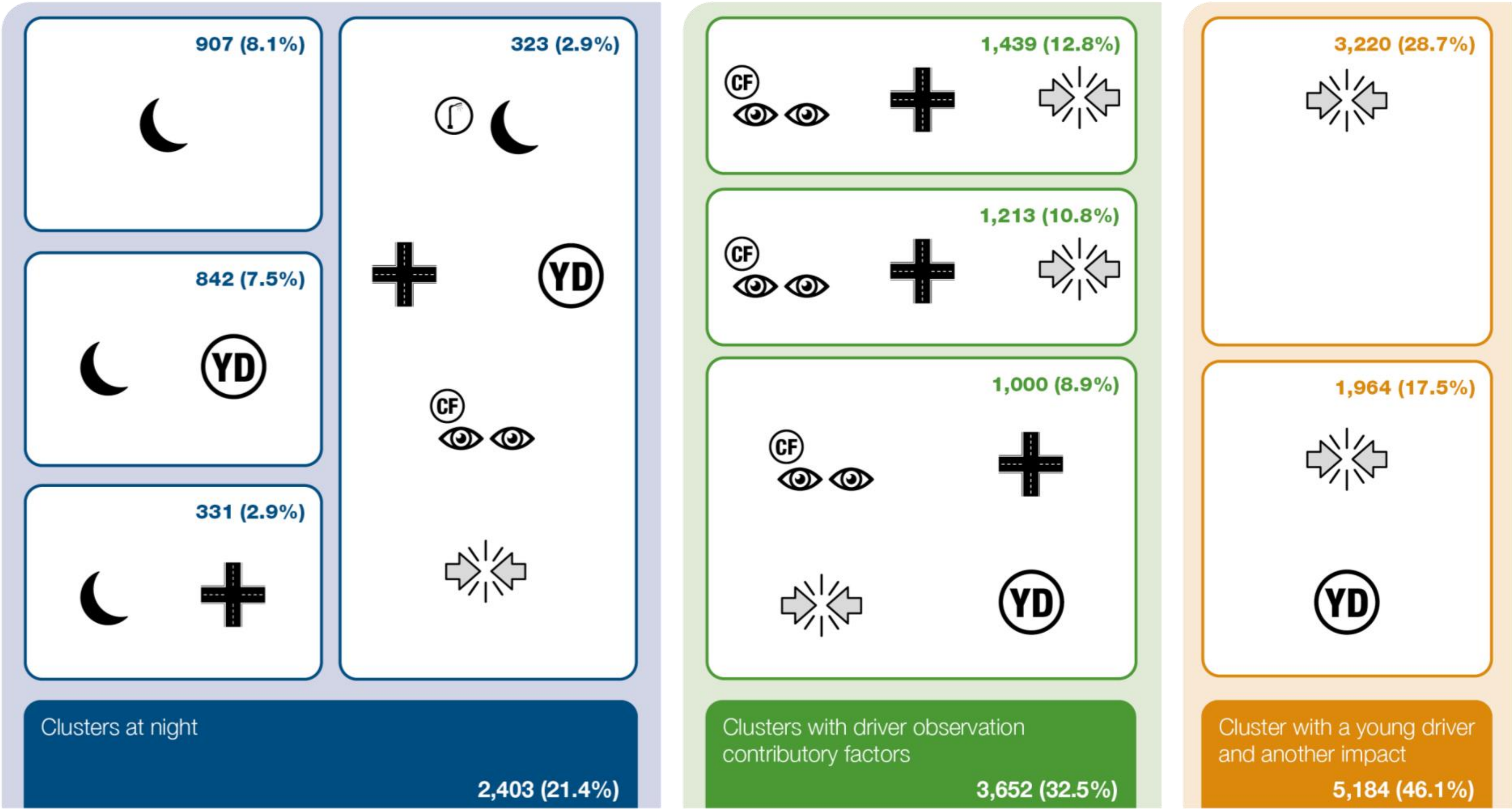
Family	Sibling	GrandSibling	Cluster ID	Count	Cluster FSCs as % of group
Night, not clustered further			DDC8	907	8.1%
Night	Young driver		DDC21	842	7.5%
Night	Uncontrolled junction		DDC37	331	2.9%
Night	Uncontrolled junction	Young driver, driver observation contributory factor (CF), other impact	DDC10	323	2.9%
Driver observation CF, uncontrolled junction, other impact			DDC9	1,439	12.8%
Driver observation CF, uncontrolled junction, other impact			DDC16	1,213	10.8%
Driver observation CF, uncontrolled junction, other impact	Young driver		DDC4	1,000	8.9%
Other impact, not clustered further			DDC20	3,220	28.7%
Other impact	Young driver		DDC19	1,964	17.5%

Source: Author's own

3.8.2 Cluster infographic

Figure 3.7 summarises all clusters in this group diagrammatically.

Figure 3.7: Cluster family diagram, all other collisions

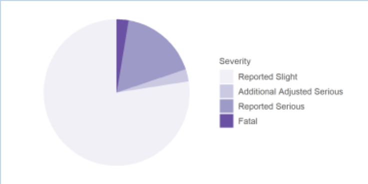
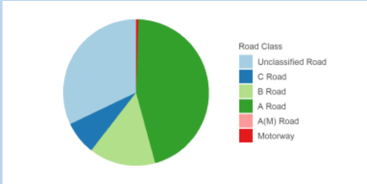
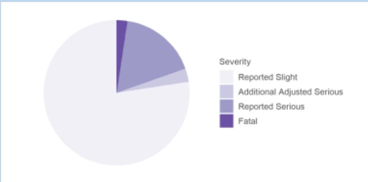
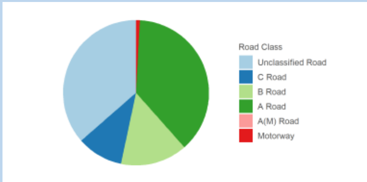
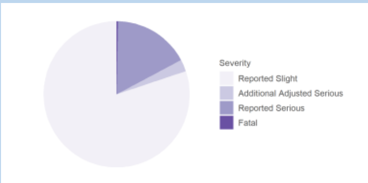
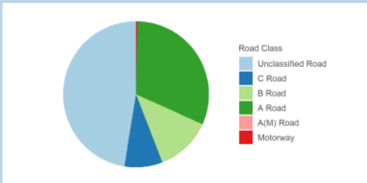
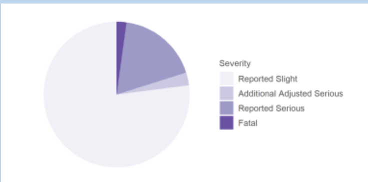
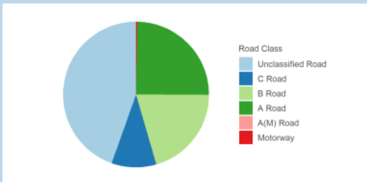
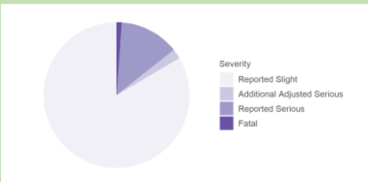
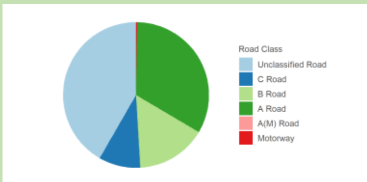


Source: Author's own

3.8.3 Cluster details

Table 3.14 summarises the most salient clusters in this group by severity and road class.

Table 3.14: Summary of clusters by severity and road class, all other collisions

	Other
DDC8	**Night**
All collisions	**Percentage adjusted fatal and serious collisions (FSCs)**
907	8.1%
	
DDC21	**Night, young driver**
All collisions	**Percentage adjusted FSCs**
842	7.5%
	
DDC37	**Night, uncontrolled junction**
All collisions	**Percentage adjusted FSCs**
331	2.9%
	
DDC10	**Night (streetlights), uncontrolled junction, young driver, driver observation contributory factor (CF), other impact**
All collisions	**Percentage adjusted FSCs**
323	2.9%
	
DDC9	**Driver observation CF, uncontrolled junction, other impact**
All collisions	**Percentage adjusted FSCs**
1,439	12.8%
	
DDC16	**Driver observation CF, uncontrolled junction, other impact**
All collisions	**Percentage adjusted FSCs**

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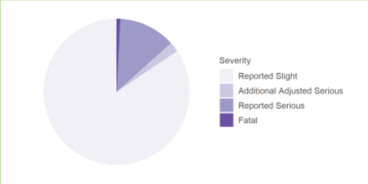
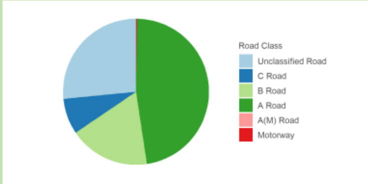
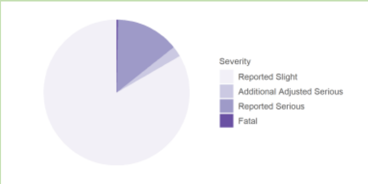
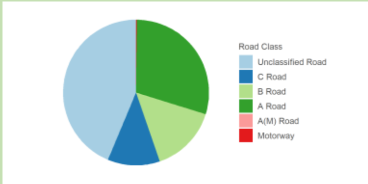
<tr><td colspan="2">
</td><td>
</td></tr>
<tr><td>DDC4</td><td colspan="2">Young driver, driver observation CF, uncontrolled junction, other impact</td></tr>
<tr><td colspan="2">All collisions</td><td>Percentage adjusted FSCs</td></tr>
<tr><td colspan="2">1,000</td><td>8.9%</td></tr>
<tr><td colspan="2">
</td><td>
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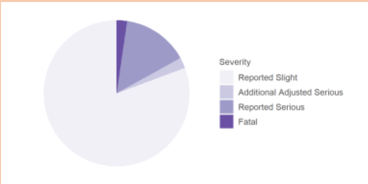
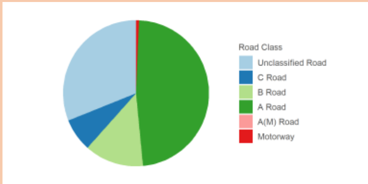
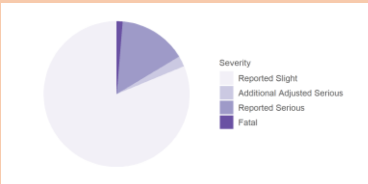
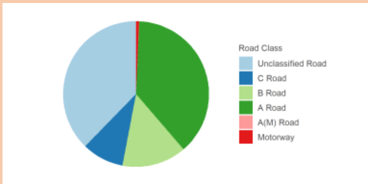
<tr><td>DDC20</td><td colspan="2">Other impact</td></tr>
<tr><td colspan="2">All collisions</td><td>Percentage adjusted FSCs</td></tr>
<tr><td colspan="2">3,220</td><td>28.7%</td></tr>
<tr><td colspan="2">
</td><td>
</td></tr>
<tr><td>DDC19</td><td colspan="2">Young driver, other impact</td></tr>
<tr><td colspan="2">All collisions</td><td>Percentage adjusted FSCs</td></tr>
<tr><td colspan="2">1,964</td><td>17.5%</td></tr>
<tr><td colspan="2">
</td><td>
</td></tr>
</table>

Source: Author's own

4 Synthesis of Key Findings from Collision Type Analysis

Since the full analytic output is available to investigators interactively, this report will concentrate on identifying and summarising key findings. Informed by the main clusters of collisions which have been identified by the collision type analysis, a detailed analysis of all input variables for DDC was undertaken. The objective was to identify key commonalities and differences between collision patterns in DDC and its identified comparator area of Avon and Somerset, while also considering the national context.

During this process, in view of the importance placed on collisions resulting in fatalities or very serious injury in the work of RCIP, this analysis considered only collisions involving killed or seriously injured casualties. However, all collisions, including those resulting in only slightly injured casualties, are reported in the dashboard. This allows investigators to view all reported collisions which exhibit a specific combination of characteristics.

In addition, the analysis applied DfT severity adjustment data[3] at individual casualty level where appropriate, to ensure that recent changes in data collection procedures did not distort the results or the validity of comparisons. Consequently, in police force areas which have not yet applied injury-based reporting practices, some casualties originally reported as slight have been split probabilistically between the serious and slight injury categories.

4.1 General observations

Overall, the output clusters for DDC differed from both the comparator force and the national picture in two noticeable respects. Firstly, contributory factor input variables appeared more prominently in cluster definitions. Secondly, the variable denoting uncontrolled junction collisions at Give Way or Stop signs was also more common. It is possible that these observations occur for different reasons.

The frequency with which contributory factors are assigned does vary between different forces. While variation in recording of factors may to some extent reflect actual differences in collisions, it may also be influenced by differences between recording practices in the police forces concerned. Therefore, the presence or absence of contributory factor variables is not by itself a reliable indicator of actual differences on the ground. On the other hand, the occurrence of collisions at uncontrolled junctions is less subjective and is therefore more likely to represent a genuine difference in trends between the two DDC forces and others.

4.2 Collisions involving pedestrian casualties

As is the case nationally, clusters of collisions resulting in pedestrian casualties in DDC are overwhelmingly formed around single-vehicle collisions, with notable families of clusters around uncontrolled junctions. However, there are some clusters which differ from both national and comparator clusters. Contributory factors assigned to pedestrians formed a sizeable family of clusters, particularly around collisions taking place in darkness.

Collisions involving young drivers also formed unique pedestrian casualty clusters in DDC. Further analysis showed that in single-vehicle collisions at uncontrolled junctions which resulted in KSI pedestrian casualties, pedestrians injured in DDC were markedly more likely to have a contributory factor assigned to them than was the case in Avon and Somerset, and also more likely than they were nationally. While this may to some extent be attributable to differing contributory factor recording practices between forces, it is notable that in these cases no clusters were formed by factors assigned to the involved young driver. Therefore, the young driver involvement may represent a demographic characteristic rather than a behavioural difference.

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[3] Severity adjustments are explained in https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/743845/severity-reporting-methodology-report.odt and available for download from https://data.gov.uk/dataset/cb7ae6f0-4be6-4935-9277-47e5ce24a11f/road-safety-data

4.3 Collisions involving cyclist casualties

Two families of collision clusters involving cyclist casualties in DDC are strikingly similar to those also observed in Avon and Somerset. One family is typified by a contributory factor being assigned to the cyclist in the same collision

as an observation contributory factor was assigned to a driver. The other family also includes both these variables, combined with the presence of an uncontrolled junction. This suggests that, to some extent, collisions of this nature are typical of areas of this kind in general rather than to DDC in any unique way.

However, this cluster family is the largest category in DDC, constituting a much larger proportion of cyclist collisions than in Avon and Somerset. In the comparator area, fewer collisions were assigned to cyclist clusters at uncontrolled junctions, and where they were so assigned, they are often associated with right-turn manoeuvres or hit-and-run drivers. Neither of these variables are prominent in DDC. It can be concluded that conflicts between cycles and other vehicles where both parties contributed, particularly at Give Ways, are recorded with notably high frequency in DDC.

To explore this further, fatal and serious collisions typified by cyclist casualties and uncontrolled junctions were analysed in more detail. Observation errors made by a participant other than a cyclist were present in 41% of cases in DDC. This is close to the national trend for such collisions. This supports the conclusion that contributory factors assigned to the cyclist rather than the conflicting driver are more prevalent in DDC; but, as observed above, it is hard to assess the extent to which this is an artefact of reporting practices.

4.4 Single-vehicle collisions

As was the case with cyclist casualty collisions, two families of single-vehicle collision clusters in DDC are very similar to those observed in Avon and Somerset. These constitute a family of such collisions occurring at night with no streetlights, and another involving young drivers. These clusters are probably related to similarities with comparator networks and communities. In both areas, the proportion of single-vehicle collision clusters at night on unlit roads is higher than is the case nationally.

However, more detailed clusters within this DDC family do provide further insight into the prevalence of certain circumstances. Specifically, nearside run-off clusters formed over half of all single-vehicle collisions. While there are also national clusters of single-vehicle run-off collisions, the relation with nearside run-offs is specific to DDC.

Other categories of sibling clusters of single-vehicle collisions are also worth noticing. A cluster of young driver collisions is present, although since this category is even more marked in Avon and Somerset it is unlikely to be a local phenomenon. A cluster more specific to DDC was single-vehicle collisions where a young driver was assigned an environmental contributory factor, which occurs more frequently than is the case nationally. This suggests that the road environment in DDC may present more challenges to inexperienced road users than elsewhere.

4.5 Collisions involving turning

Once again, two families of clusters of collisions involving vehicle turning manoeuvres in DDC are very similar to those observed in Avon and Somerset. Collisions in both these clusters involved a driver turning right at an uncontrolled junction with a contributory factor assigned to them, and also an observation contributory factor assigned to an involved driver (not necessarily to the turning driver). Again, the prominence of this cluster in both areas suggest that it is typical of road networks of that kind, rather than to DDC alone.

One of the clusters also featured the involvement of a young driver, a topic which was explored in more detail. KSI casualties in collisions involving a right turn at an uncontrolled junction do involve young drivers in DDC more often than is the national norm, although not by a large margin. Despite the presence of a similar cluster in Avon and Somerset, young drivers are slightly less frequently involved in such collisions there than is the case nationally.

4.6 Collisions involving environment contributory factors

Clusters of collisions involving environment contributory factors are similar in DDC to the national equivalents, although it is notable that none of them feature the involvement of adverse weather as a common factor. This may mean that non-weather environmental factors, such as road layout, feature more prominently in the area than elsewhere.

Avon and Somerset did not exhibit a group of clusters in this category, though this could be related to different contributory factor recording practices between forces, rather than a marked difference in the collisions themselves.

Since involvement of young drivers was a feature of both local and national clusters in this category, a further examination was conducted to compare their involvement in collisions with environmental contributory factors which resulted in KSI casualties. There is no evidence that young drivers are assigned environmental factors any more often than such drivers are elsewhere in the country.

4.7 Collisions involving shunts

The group of clusters involving shunts is unique to DDC: it does not feature either in the comparator area or in the national clusters. The definition of a shunt employed by the analysis is: at least one vehicle involved in the collision had a rear impact, while at least one other vehicle *travelling in the same direction* also had an impact (which was not a rear impact).

The most prominent shunt collision cluster family was quite specific, involving a driver observation contributory factor and a slow-vehicle manoeuvre (meaning a vehicle stopping, moving off or held up by traffic). It may be that this does indicate an unusual prevalence of such circumstances in the area. This could be related to road design characteristics, behavioural tendencies, or a combination of both, and is worthy of further examination.

The involvement of young drivers in shunt collisions in slow-moving traffic in DDC was compared to similar outcomes nationally, but there is no evidence that they are involved in this variety of collision any more frequently than elsewhere.

Appendix A: Input Variables

For an explanation of how these input variables were applied during machine learning, see section 2.2 Input data in the accompanying methodology paper.

Table A.1: Collision input variables

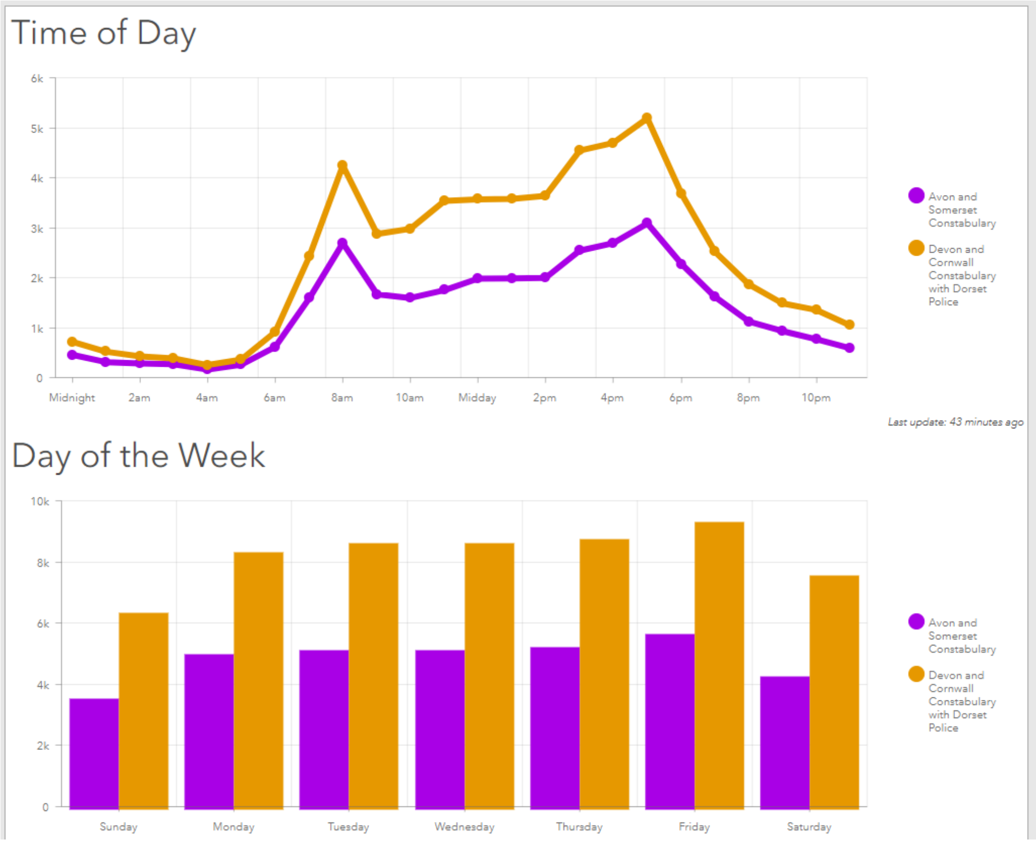
Group	Title	Type	Definition	Model usage
101a	Severity_Fatal	Boolean	True: at least one casualty was killed	Used subtly
101b	Severity_Serious_Adjusted	Continuous	Probability that at least one casualty would have been classified as serious if injury-based reporting had been in place	Used subtly
102a	Junction_Controlled	Boolean	True: junction with ATS (automatic traffic signal) or authorised person	Used moderately in DDC, and subtly nationally
102b	Junction_Uncontrolled_Roundabout	Boolean	True: junction with roundabout or mini-roundabout	Used moderately in DDC, and subtly nationally
102c	Junction_Uncontrolled_Other	Boolean	True: junction with Give Way or Stop (not at roundabout)	Used extensively
103	Weather_Adverse	Boolean	True: any inclement weather conditions (rain, snow, fog, other with or without high winds)	Used subtly
104a	Date_PH	Boolean	True: was a weekday public holiday (Christmas, Easter or bank holiday)	Ignored as irrelevant
104b	Date_Weekend	Boolean	True: was a Saturday or Sunday	Ignored as irrelevant
105a	Time_Rush_AM_7to9	Boolean	True: was at or after 7 a.m. and before 9 a.m.	Used moderately nationally, but ignored in DDC
105b	Time_Night_7to7	Boolean	True: was at or after 7 p.m. and before 7 a.m. the following day	Used extensively in DDC, and moderately nationally
106a	Night_Streetlights	Boolean	True: was dark, and streetlights were present and lit	Used extensively
106b	Night_NoStreetlights	Boolean	True: was dark, and no lit streetlights were present	Used extensively in DDC, and moderately nationally
107	Vehicles_Single	Boolean	True: only one vehicle was involved	Used extensively
108	Population_Density_Raw	Continuous	Population per square km of Lower Layer Super Output Area (LSOA) / data zone in mid-2018	Ignored as irrelevant
109	Dynamics_HeadOn	Boolean	True: at least one vehicle had a front impact; *and* at least one other vehicle travelling in the opposite direction also had an impact	Used extensively in DDC, and moderately nationally

110	Dynamics_Shunt	Boolean	True: at least one vehicle had a rear impact; *and* at least one other vehicle travelling in the same direction also had an impact	Used extensively
111	Dynamics_SideImpact	Boolean	True: at least one vehicle had a side impact; *and* at least one other vehicle travelling in an adjacent direction also had an impact	Used moderately
112	Dynamics_OtherImpact	Boolean	True: at least two vehicles had impacts	Used extensively
113	Vehicles_Count	Continuous	Number of vehicles involved	Used subtly
114	Casualties_Count	Continuous	Number of casualties resulting (of all severities)	Used subtly

Source: Author's own

Figure A.1 shows some collision variables applied to trend analysis in an area dashboard.

Figure A.1: Collision variables applied to trend analysis in an area dashboard



Source: Author's own

Table A.2: Vehicle input variables

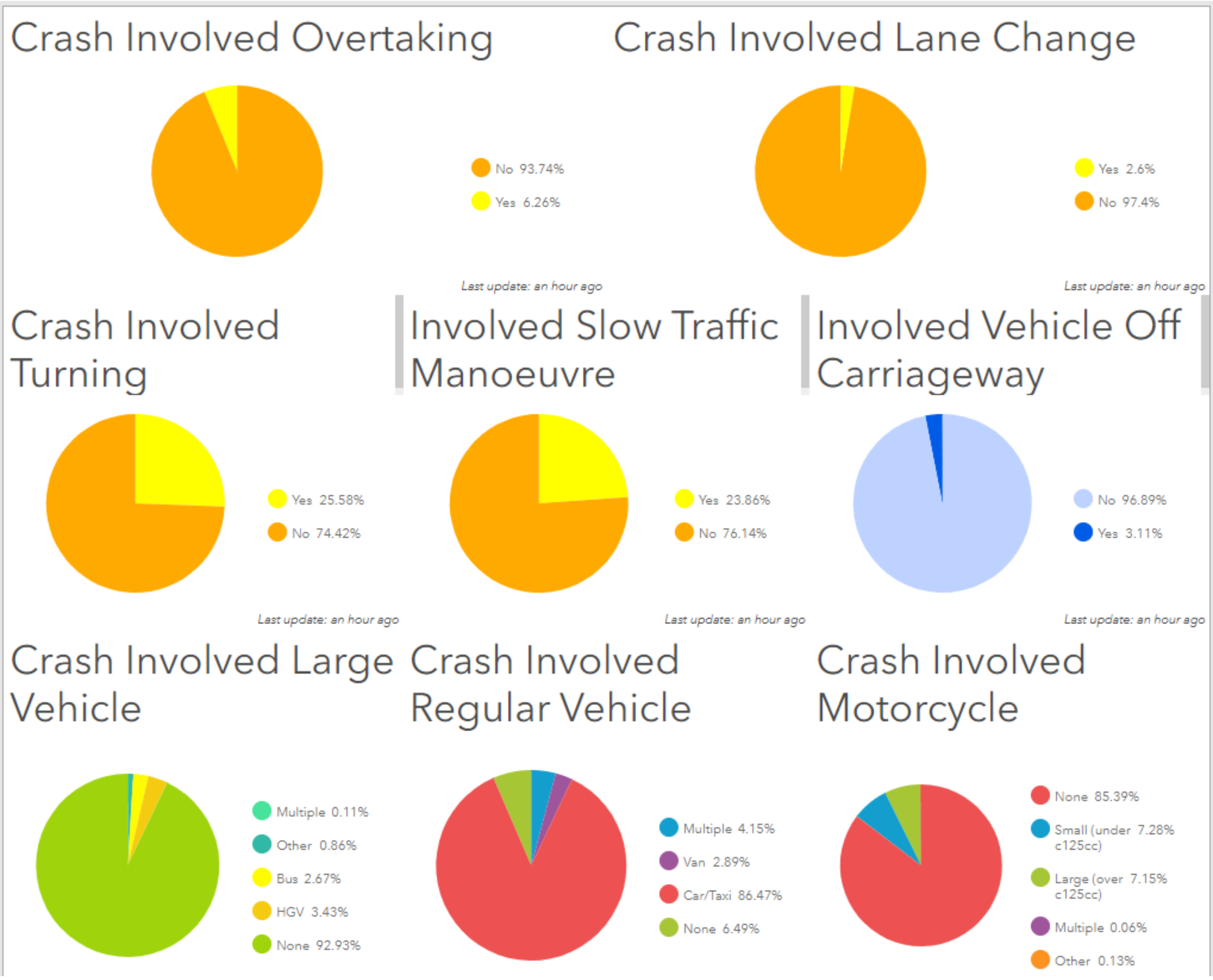
Group	Title	Type	Definition	Model usage
201a	Runoff_Nearside	Boolean	True: vehicle left carriageway to the nearside (whether rebounded or not)	Used extensively
201b	Runoff_Other	Boolean	True: vehicle left carriageway in any other fashion	Used moderately
202	Vehicle_HitRun	Boolean	True: vehicle was hit-and-run (excluding non-stop vehicles not hit)	Used subtly
203	Vehicle_NotInMainCway	Boolean	True: any vehicle on a footway; any vehicle on, entering or leaving a hard shoulder; a vehicle other than a bus in a bus lane or busway; or any vehicle other than a tram on a tram track	Ignored as irrelevant
204a	Vehicle_Overtaking	Boolean	True: vehicle was overtaking (offside or nearside)	Used subtly
204b	Vehicle_LeftTurn	Boolean	True: vehicle was turning left, or waiting to do so	Used moderately
204c	Vehicle_RightTurn	Boolean	True: vehicle was turning right, or waiting to do so	Used extensively
204d	Vehicle_SlowManeouvre	Boolean	True: vehicle was stopping, stationary or moving off	Used extensively

204e	Vehicle_LaneChange	Boolean	True: vehicle was changing lane (to left or right)	Used subtly
205a	Vehicle_Moped	Boolean	True: vehicle was a motorcycle with engine size 50cc or under	Used moderately in DDC, but ignored nationally
205b	Vehicle_MC_MidSize	Boolean	True: vehicle was a motorcycle with engine size over 50cc up to 500cc (includes vehicles which were electric or of unknown engine size)	Used moderately in DDC, and subtly nationally
205c	Vehicle_MC_Large	Boolean	True: vehicle was a motorcycle with engine size over 500cc	Used moderately in DDC, and subtly nationally
205d	Vehicle_Large_GV_PSV	Boolean	True: vehicle was a bus, coach or tram; or a goods vehicle over 3.5 tonnes mgw or of unknown weight	Used moderately in DDC, and extensively nationally
206a	Driver_Young_Under25	Boolean	True: driver/rider of motor vehicle was aged 16–24 inclusive	Used extensively in DDC, and moderately nationally
206b	Driver_Old_70Plus	Boolean	True: driver/rider of motor vehicle was aged over 69	Used extensively
207	Driver_Deprived_BottomQuintile	Boolean	True: driver's home postcode was in a LSOA classified by the ONS in the most deprived quintile of the Index of Multiple Deprivation	Used moderately nationally, but ignored in DDC
208	Driver_Working	Boolean	True: driver was recorded as working; and/or was driving a large vehicle; and/or was on a commuting journey in a taxi or light goods vehicle	Used extensively

Source: Author's own

Figure A.2 shows some of these vehicle variables applied to trend analysis in an area dashboard.

Figure A.2: Vehicle variables applied to trend analysis in an area dashboard



Source: Author's own

Table A.3: Casualty input variables

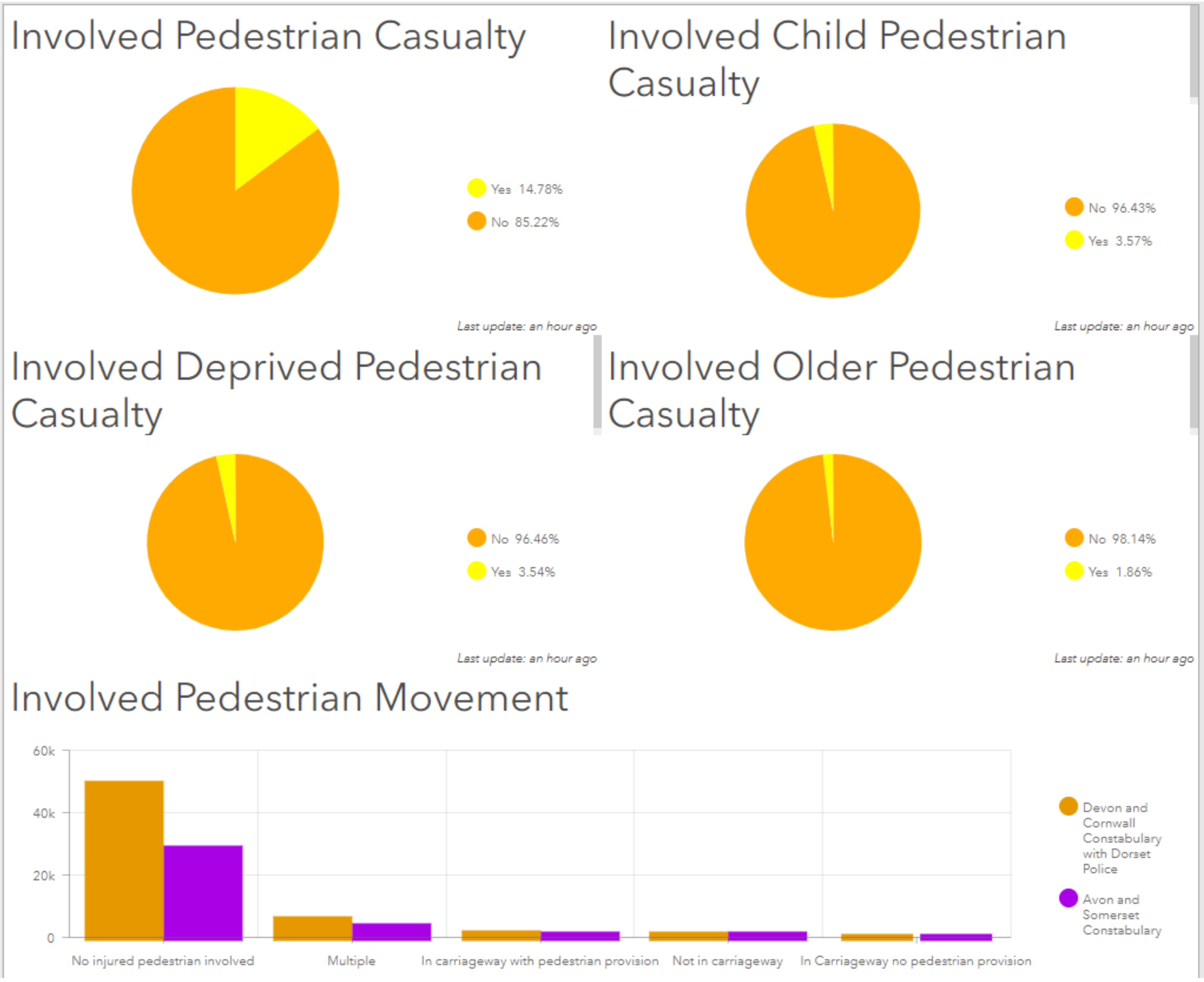
Group	Title	Type	Definition	Model usage
301a	Casualty_PCUser	Boolean	True: casualty was rider or pillion passenger on a cycle	Used extensively
301b	Casualty_HorseRider	Boolean	True: casualty was rider or pillion passenger on a horse	Ignored as irrelevant
301c	Casualty_MobilityScooterUser	Boolean	True: casualty was rider or pillion passenger on a mobility scooter	Ignored as irrelevant
302	Casualty_Pedestrian	Boolean	True: casualty was a pedestrian	Used extensively
303a	Casualty_ChildPedestrian_Under16	Boolean	True: casualty was a pedestrian aged under 16	Used extensively
303b	Casualty_OldPedestrian_70Plus	Boolean	True: casualty was a pedestrian aged over 69	Used moderately

304a	Casualty_Pedestrian_CrossingOrRefuge	Boolean	True: casualty was a pedestrian on a crossing, refuge or central island	Used moderately
304b	Casualty_Pedestrian_Footway	Boolean	True: casualty was a pedestrian on a footway	Used moderately in DDC, and subtly nationally
305	Casualty_Pedestrian_InCway_Masked	Boolean	True: casualty was a pedestrian anywhere in the carriageway who was masked by a stationary or parked vehicle	Used moderately in DDC, and subtly nationally

Source: Author's own

Figure A.3 shows some casualty variables applied to trend analysis in an area dashboard.

Figure A.3: Casualty variables applied to trend analysis in an area dashboard



Source: Author's own

Table A.4: Contributory factor input variables

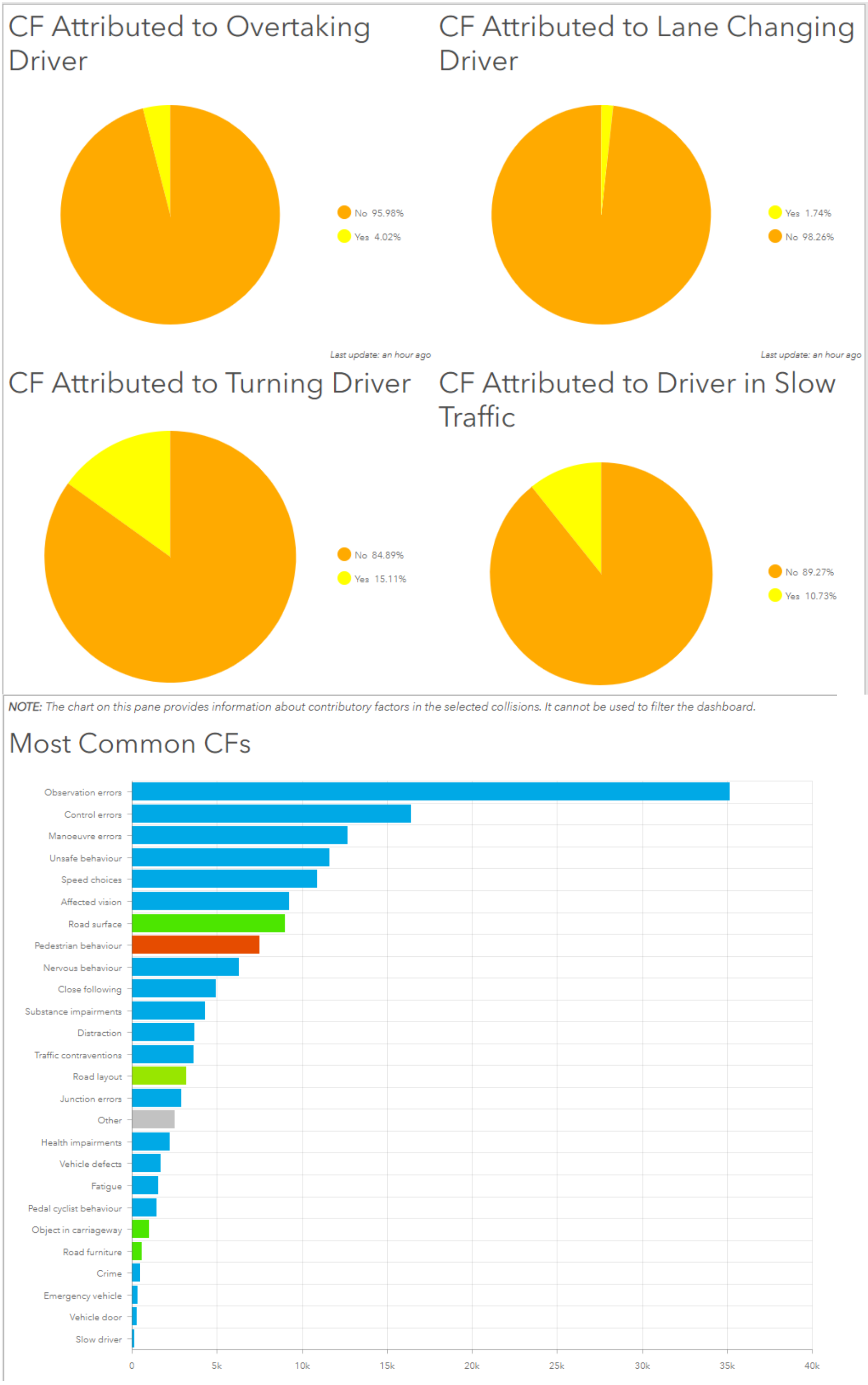
Group	Title	Type	Definition	Model usage
401a	Pedestrian_Casualty_Contributed	Boolean	True: any injured pedestrian or vehicle passenger had a pedestrian contributory factor (CF) assigned to them	Used extensively
401b	Pedestrian_Uninjured_Contributed	Boolean	True: any uninjured pedestrian had a pedestrian CF assigned to them	Ignored as irrelevant
402a	Driver_Contributed_Overtaking	Boolean	True: any overtaking driver or rider had any driver/rider CF assigned to them	Used subtly
402b	Driver_Contributed_Turning	Boolean	True: any turning driver or rider had any driver/rider CF assigned to them	Used extensively
402c	Driver_Contributed_LaneChange	Boolean	True: any lane-changing driver or rider had any driver/rider CF assigned to them	Used subtly
403a	Cyclist_Contributed	Boolean	True: any cyclist had any CF assigned to them	Used extensively
403b	P2W_Rider_Contributed	Boolean	True: any motorcyclist had any CF assigned to them	Used moderately in DDC, and subtly nationally
403c	Large_GV_PSV_Driver_Contributed	Boolean	True: any large vehicle driver had any CF assigned to them	Used moderately in DDC, and extensively nationally
404	Environmental_Factor_Contributed	Boolean	True: any participant had an environmental, vision-affected or other specific CF assigned to them	Used extensively
405	Vehicle_Factor_Contributed	Boolean	True: any driver or rider had a vehicle defect CF assigned to them	Ignored as irrelevant
406	Driver_Crime_Contributed	Boolean	True: any driver or rider had a crime-related CF assigned to them	Ignored as irrelevant
407	Driver_Intoxicated_Contributed	Boolean	True: any driver or rider had an intoxication CF assigned to them	Used moderately in DDC, but ignored nationally
408	Driver_SpeedChoice_Contributed	Boolean	True: any driver or rider had a speed choice CF assigned to them	Used moderately in DDC, and subtly nationally
409	Driver_MobilePhone_Contributed	Boolean	True: any driver or rider had mobile phone CF assigned to them	Ignored as irrelevant
410	Driver_CloseFollowing_Contributed	Boolean	True: any driver or rider had close following CF assigned to them	Used moderately in DDC, and subtly nationally
411	Driver_Disobeyed_Contributed	Boolean	True: any driver or rider had any ‘disobeyed sign or marking’ CF assigned to them	Used subtly

412	Driver_Observation_Contributed	Boolean	True: any driver or rider had any observation CF assigned to them	Used extensively
413	Driver_Fatigue_Contributed	Boolean	True: any driver or rider had fatigue CF assigned to them	Ignored as irrelevant
414	Driver_Distracted_Contributed	Boolean	True: any driver or rider had any distraction CF assigned to them	Ignored as irrelevant
415	Driver_Careless_Contributed	Boolean	True: any driver or rider had aggressive and/or careless CF assigned to them	Used subtly in DDC, but ignored nationally

Source: Author's own

Figure A.4 shows some contributory factor (CF) variables applied to trend analysis in an area dashboard.

Figure A.4: Contributory factor (CF) variables applied to trend analysis in an area dashboard

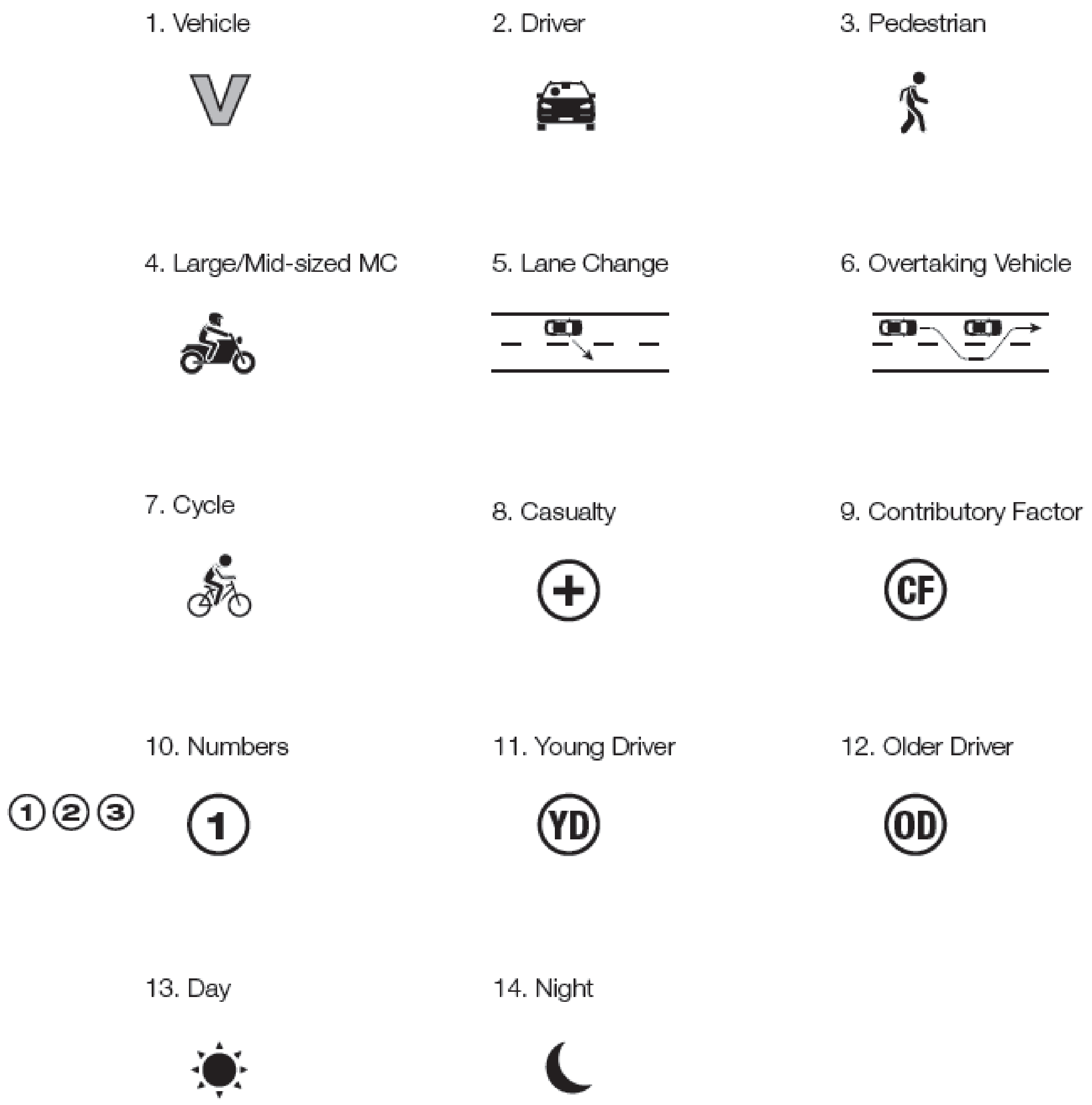


Source: Author's own

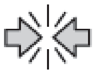
Appendix B: Infographics Key

Figure A.5 shows the key for icon used in the cluster diagrams

Figure A.5: Infographics Key (source: author's own)



15. Other Impact



16. Driver Observation CF

17. Shunt

18. Uncontrolled Junction

19. Right Turn

20. Driver Turning CF

21. Environment CF

22. Runoff (nearside)

23. Young Driver

24. Older Driver

25. Night (streetlights)

26. Night (no streetlights)

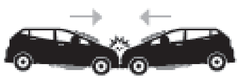
27. Runoff (other)

28. Pedestrian footway

29. Slow Vehicle Manouever

30. Working Driver

31. Head On



32. Roundabout

33. Cyclist Casualty

34. Pedestrian Casualty

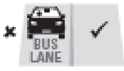
35. Deprived Driver

36. Hit and Run

37. LGV/PSV

38. Side Impact

39. Vehicle not in Carriageway



40. Pedestrian CF

41. Single Vehicle

42. Child Pedestrian Casualty

43. LGV/PSV CF

44. Driver Overtaking CF

45. P2W rider CF

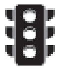
46. Large MC

47. Mid-sized MC

48. Moped

49. Left Turn

50. Controlled Junction



51. Pedestrian on Crossing

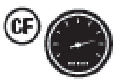
52. Adverse Weather

53. Weekend

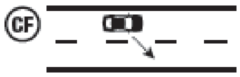
54. Close following CF

55. No distinguishing Features

56. Speed Choice CF

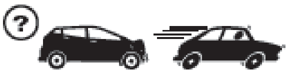


57. Lane Change CF



58. Careless driver CF

59. More likely hit and run



60. Cyclist CF

61. Working Young or Old

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