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Driver distraction related crashes in New Zealand

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The Ministry of Transport in New Zealand is currently undertaking a project on driver distraction. One of the aims of the project is to provide an overview of the current New Zealand situation and a more detailed crash analysis of internal and external distractions involved in crashes. This paper presents the results of an examination of crashes that include the driver distraction contributory cause codes contained within the police-reported New Zealand Crash Analysis System (CAS). Two approaches are being used to examine the data. The first summarised the crash information from 2002-2003 based on the driver distraction cause codes used in the system and categorised them into inside/outside the vehicle distraction types allowed by the coding detail. The second approach reviewed the individual traffic crash reports for distraction related crashes in 2002-2003. This provides a comparison with the cause codes from the first approach and allows a more detailed breakdown of driver distraction in terms of the type of behaviour and the objects or action/s involved. A summary of the current internal and external driver distraction situation for New Zealand, including a detailed behaviour/item breakdown, will be provided. Differences between the two approaches will be commented on and implications for New Zealand and future directions will be discussed.

Introduction

The New Zealand Ministry of Transport is undertaking a project on driver distraction with the aim of assessing the size and nature of the problem, the risks associated with inside and outside the vehicle driver distraction sources, and to identify potential countermeasures. A part of this project includes an analysis of the police reported crashes contained within the New Zealand crash analysis system (CAS). The purpose of this analysis is to provide an overview of the size of the problem, and a breakdown of inside and outside the vehicle distractions in terms of the objects, behaviours, typical crash movements and other factors involved in driver distraction related crashes. A secondary purpose of the crash analysis is to review the current use of cause codes within the CAS system for driver distraction sources.

Stutts, Reinfurt, Staplin and Rodgman (2001) and Young, Regan and Hammer (2003) argue that driver distraction is one aspect of the broader problem of driver inattention. They defined driver distraction as “when the driver is delayed in the recognition of information needed to safely accomplish the driving task because some event, activity, object or person within or outside the vehicle compelled or tended to induce the driver’s shifting attention away from the driving task” (Stutts et al, 2001, pg 6). To qualify as driver distraction there needs to be some sort of triggering event/stimuli that occupies (to some degree) the driver’s attention. Both Stutts et al (2001) and Young et al (2003) have used the National Highway Traffic Safety Administrations’ (NHTSA) thirteen sources of distraction as a guide to defining what qualifies as driver distraction. This project has adopted this definition of driver distraction and the NHTSA sources as a guide to the analysis.

The NHTSA sources of distraction include:

- Eating or drinking

- Outside person, object or event
- Adjusting radio, cassette, or CD
- Other occupants in vehicle
- Moving object in vehicle
- Smoking related
- Talking or listening on mobile phone
- Dialling mobile phone
- Using device/object brought into vehicle
- Using device/object integral to vehicle
- Adjusting climate controls
- Other distraction
- Unknown distraction

The CAS cause codes that best capture the NHTSA sources of distraction is the group of ten specific cause codes (codes 351-360) that are under the general cause code of 'Attention diverted by' (cause code 350). These cause codes are summarised in Table 1. The 350-360 cause codes include inside and outside the vehicle sources of distraction, but based on their descriptions they are also likely to include sources of inattention that are not specifically driver distraction. In particular it seems likely that the '357: Emotionally upset' cause code is likely to contain a mixture of driver distraction and/or inattention sources (a concern borne out in the analysis).

Table 1. Description of the attention diverted by codes and likely source

CAS cause code (Number and Description)	Likely source of distraction (inside or outside)
350: Attention diverted by	Inside and outside distraction
351: Passengers	Inside distraction
354: Animal or insect in vehicle	Inside distraction
358: Cigarette, radio, glove box etc	Inside distraction
359: Cellphone or communications device	Inside distraction
357: Emotionally upset	Inside distraction or Inattention
352: Scenery or persons outside vehicle	Outside distraction
353: Other traffic	Outside distraction
355: Trying to find intersection, house number, destination	Outside distraction
356: Advertising or signs	Outside distraction
360: Driver dazzled	Outside distraction or Inattention

Two basic approaches were adopted to examine the attention diverted by cause codes for sources of driver distraction. The first approach, referred to as the CAS cause code analysis, examined the cause code categories currently in use to provide an overview and estimate of the size of the problem in New Zealand. However these cause codes do not provide sufficient detail to examine what specific objects and/or behaviours were involved. This information is often contained in the descriptions of the traffic crash reports, but this requires that each individual crash is reviewed.

The second approach, referred to as the crash report analysis, aimed to review all of the crashes that included the attention diverted by cause codes as a contributing cause for a two year period, 2002 and 2003. The approach categorised each crash into the objects involved and behaviours involved. This coding structure was developed separately from the cause code structure used in the CAS system, and was guided by the observational work on distractions by Stutts et al (2003) for behavioural categories, and by preliminary analyses of samples of the traffic crash reports contained in CAS to provide indications of the level of detail achievable within the traffic crash descriptions. To date, the crash report analysis has been completed for the crashes relating to the five codes associated with the inside the vehicle distractions (351, 354, 357, 358 and 359) and the code for 'general attention diverted by' (350) for 2002 and 2003. This report will summarise the crash statistics based on the CAS cause codes for inside and outside the vehicle distraction sources and the initial results of the crash report analysis for inside the vehicle distraction sources for the two years 2002 and 2003.

CAS code analysis

In 2002 and 2003, there were 2021 police reported casualty crashes in New Zealand where driver distraction (as represented by the attention diverted cause codes 350-360) was considered to be a contributing factor in the crash (see Table 2). This equates to 9.7% of all the casualty crashes (a total of 20,808) that occurred during this two year period (LTSA, 2004). This estimate should be treated as a lower bound estimate as it is likely to be an underestimate driver distraction involvement in crashes. For example, the 350-360 cause codes that most closely match the NHTSA driver distraction sources were examined, but there are other driver inattention categories (such as 330: Inattentive, failed to notice and 370: Did not see or look for another party until too late) which may also include driver distraction sources within them. Nevertheless, the 10% estimate of driver distraction involvement in all crashes is similar to that of others such as Stutts et al (2001) whose estimate ranged from 8-13% depending upon whether drivers with unknown attention/driver distraction status were included or not.

Table 2 summarises the number of police reported crashes and casualties associated with the 'Inattention diverted by' cause codes in 2002 and 2003 by the source of distraction based on the CAS cause code analysis. This analysis suggests that inside the vehicle sources of driver distraction (represented by the five cause codes 351, 354, 357, 358 and 359) are involved in approximately 44% of all driver distraction crashes. Outside the vehicle sources of driver distraction (represented by the five cause codes 352, 353, 355, 356 and 360) are involved in approximately 46% of all driver distraction crashes. The remaining 10% include crashes with multiple attention diverted by cause codes and the general non-specific 350 cause code where it is not clear whether the source is inside or outside the vehicle. In terms of the number of fatal crashes involving driver distraction, it appears that there are nearly twice as many fatal crashes associated with the inside the vehicle distractions when compared to outside the vehicle distractions. However caution should be exercised in interpreting these estimates based on the CAS cause code analysis as the results of the crash report analysis on the objects and/or behaviours have not yet been discussed.

Table 2 also suggests that some of the cause codes intended to cover driver distraction are under and/or over utilised. For example, the 358: Cigarette, radio, glove box etc cause code appears to be over utilised as it encompasses a potentially wide variety of sources of distraction, objects and/or behaviours. Improvements might be achieved by re-thinking what this code covers in terms of specific driver distraction sources. On the other hand, 356:

Advertising or signs, appears to be under utilised and may be better incorporated into other cause codes.

Table 2: Number of crashes (by worst injury sustained) for 2002 and 2003 for the attention diverted codes 350-360

CAS cause code	Number of crashes by worst injury (2002 and 2003)		
	Fatal Crashes	Injury Crashes	Total Crashes
<i>Inside the vehicle distraction sources</i>			
351: Passengers	8	205	213
354: Animal or insect in vehicle	0	37	37
357: Emotionally upset	8	128	136
358: Cigarettes, radio, glove box etc	8	399	407
359: Cellphone or communications device	6	89	95
<i>Total for internal distraction sources</i>	<i>30</i>	<i>858</i>	<i>888</i>
<i>Outside the vehicle distraction sources</i>			
352: Scenery or persons outside vehicle	6	213	219
353: Other traffic	2	344	346
355: Trying to find intersection, house number, destination	1	67	68
356: Advertising or signs	0	8	8
360: Driver dazzled	7	279	286
<i>Total for external distraction sources</i>	<i>16</i>	<i>911</i>	<i>927</i>
<i>Other distraction sources</i>			
Multiple 350-360 codes in same crash	3	22	25
350: Attention diverted (not specific)	3	178	181
<i>Total for other distraction sources</i>	<i>6</i>	<i>200</i>	<i>206</i>
Total distraction crashes (codes 350-360)	52	1969	2021
All crashes for 2002/2003 (any cause)	800	20008	20808

Review of crash reports

The crash report analysis to date reviewed the individual crash reports that included the attention diverted cause codes (351, 354, 357, 358 or 359) associated with the inside the vehicle distractions and the '350: Attention diverted by' cause code, as contributory factors to the crash. Based on the analysis of the crash reports, the NHTSA's thirteen sources of distraction, the observational work of Stutts et al (2003), and preliminary samples of the data, eleven sources of inside the vehicle distraction were developed for the analysis. These are summarised in Table 3.

Each of these sources was then broken down into the specific objects and/or the specific behaviour involved. The analysis wanted to keep the object involved in the distraction and the behaviour involved with the object as separate categories. This allows flexibility in

grouping the information for analysis purposes and for comparison with international research.

Table 3. Sources of inside the vehicle distraction used in the crash report analysis

Inside the vehicle distraction source	Description
1. Passengers	Where the source of distraction is from, related to or in response to one or more passengers actions.
2. Telecommunications	Where the objects involved are related to telecommunication devices (at present cellphone, pagers or radio-telephones) and actions to use them. They may or may not be brought into the vehicle.
3. Emotionally upset-preoccupied	Where the source of the distraction relates to the driver, where they are upset, crying etc and passengers are not involved.
4. Food-drink	Where the object involved relates to food or drink objects or containers and actions to use them.
5. Personal effects	Where the objects involved relate to items brought into vehicle such as books, bags, tissues, briefcases, etc. Also includes clothing and glasses.
6. Smoking	Where the objects involved relate to smoking (pipes, cigarettes, lighters etc) and actions to use them.
7. Entertainment systems	Where the objects involved relate to the entertainment system of the vehicle (currently stereo/CD/radio/cassettes) or similar items brought into the vehicle for the same purpose, and actions to use them.
8. Vehicle controls/devices	Where the objects involved relate to controls/devices or gauges integral to the vehicle (other than entertainment). Also includes physical adjustments to mirrors and the windscreen etc.
9. Animal or insect in vehicle	Where the objects involved relate to animals or insects in the vehicle.
10. Sneezing/coughing/itching	Where the source of the distraction is related to the driver only, and the actions are similar to sneezing, coughing, itching or stretching.
11. General distraction - inside	Where enough information is provided to assign the distraction as inside the vehicle but there is insufficient information to categorise the object involved further.

Table 4. Summary of the involvement of different driver distraction sources based on the crash report analysis of inside the vehicle related attention diverted codes (350, 351, 354, 357, 358 and 359) during 2002 and 2003.

Distraction Source	Number of crashes involving the distraction source by worst injury sustained (2002 and 2003)					Number of casualties by injury from crashes involving the distraction source (2002 and 2003)				
	Fatal	Serious	Minor	Total	Proportion of crash involvement	Fatal	Serious	Minor	Total	Proportion of casualties
Passenger/s	8	53	162	223	25%	11	83	300	394	30%
Telecommunications	7	14	88	109	12%	9	20	130	159	12%
Entertainment systems	0	15	88	103	12%	0	17	125	142	11%
Emotionally Upset- Preoccupied	6	18	67	91	10%	6	20	85	111	8%
Personal Effects	0	13	71	84	9%	0	14	93	107	8%
Vehicle Controls/Devices	2	18	55	75	8%	2	22	91	115	9%
Food-Drink (2)	3	8	54	65	7%	4	10	74	88	7%
General Distraction – Inside	1	7	40	48	5%	2	8	56	66	5%
Smoking	0	10	36	46	5%	0	12	57	69	5%
Animal-Insect Inside Vehicle	0	3	33	36	4%	0	3	48	51	4%
Sneezing/Coughing/Itching	0	1	11	12	1%	0	1	14	15	1%
Total Crashes – All internal	26	158	697	881		32	206	1060	1298	

Note: The total crashes figure is the total number of crashes that have involved one or more distraction sources. Crashes with multiple distraction sources have only been counted once.

Table 5. Summary of typical crash movement codes involved in crashes associated with passenger, telecommunications and emotionally upset-preoccupied sources of inside the vehicle driver distraction for roads (50-80km/h speed limit) and open (100km/h speed limit) roads.

Type of crash	Passenger/s			Telecommunications			Emotionally upset - preoccupied		
	50-80	Open	Total	50-80	Open	Total	50-80	Open	Total
Overtaking and lane change	1		1	2	1	3		1	1
Head on	8	8	16	5	4	9		2	2
Lost control – straight	17	24	41	5	8	13	12	9	21
Lost control – cornering	17	27	44	7	27	34	24	17	41
Collision with obstruction	19	1	20	7	1	8	3		3
Rear end	24	5	29	10	7	17	5	3	8
Turning versus same direction	15	4	19	6	3	9			
Crossing (no turns)	24	1	25	5		5	7	1	8
Crossing (vehicle turning)	4	1	5	2		2	2	1	3
Merging								1	1
Right against turn	5	3	8	1		1			
Manoeuvring	5	1	6	2		2		2	2
Pedestrian crossing road	4		4	4		4	1		1
Pedestrians other	4		4	2		2			
Miscellaneous	1		1						
Total (crash involvement)	148	75	223	58	51	109	54	37	91

Note: A summary of the crash movements is provided in the Appendix.

The key determinant for which distraction source a crash would be placed under was the object involved rather than the behaviour involved. For example, if the object involved was a cell phone, it would be coded under telecommunications whether the behaviour involved was using/dialling or moving/searching for the cell phone. Where multiple distraction causes were involved in the same crash they were each assigned to the applicable source of distraction, with a code added to indicate that there were multiple distraction causes present in order to distinguish between involvement of the distraction source in crashes from the total number of crashes that included driver distraction.

Table 4 provides a summary of the crash involvement of each of the inside the vehicle distraction sources. The table has been ordered from highest to lowest in terms of the contribution that the source makes to the total number of crashes over the two year period¹. The highest three contributing inside the vehicle distractions were passengers (25%) followed by telecommunications and entertainment (at 12% each). Overall, there were 881 crashes associated with inside the vehicle distractions, where the worst injury sustained was a fatality in 26 crashes and an injury was sustained in 855 crashes. This compares favourably with the total number of inside the vehicle distractions obtained from the CAS cause code analysis (see Table 2) – a total of 888 crashes of which 30 were fatal and 858 were injury crashes. However it is worth noting that while the totals and the totals for involvement of specific codes are within the same ballpark for the two methods, there was considerable inconsistency between the CAS cause coding and the crash report analysis methods. For example, for 130 crashes (approximately 15% of the inside the vehicle related crashes) there was disagreement in terms of the CAS cause code assigned and the broad inside distraction source assigned from the crash report analysis.

One potential distraction source, the emotionally upset/preoccupied source, which directly relates to the CAS code 357: Emotionally upset is problematic as it may not be a driver distraction issue. This source is discussed more fully in a subsequent section of the report. At the moment, it is noted that there may be room to argue that the crashes included under this source are potentially debatable as driver distraction. If these crashes were to be discounted as legitimate driver distraction crashes then the CAS cause code analysis would appear to significantly overestimate the number of inside the vehicle distraction crashes.

The information on the crash picture for inside the vehicle distractions for the two years 2002 and 2003 contained in Table 4, can be contrasted with New Zealand focus group research on how the public view the perceived frequency and perceived risk of different driver distraction sources (Barker, 2005). The remainder of this report briefly discusses each of the sources of distraction and the objects, behaviours and typical kind of crash involved.

Passengers

In 2002 and 2003 passengers were involved as a source of driver distraction in 223 crashes resulting in 11 fatalities, 83 serious injuries and 300 minor injuries (Table 4). Passengers were the single largest source of inside the vehicle distractions at 25%. Approximately 66% of these crashes occurred on roads with speed limits between 50-80km/h (the remainder occurred on the open road with 100km/h speed limits). The typical type of crash involved was reasonably well spread across a variety of accident movement types for the 50-80km/h roads (Table 5). For example, the top three were rear-end at 16%, crossings with no turns at 16% and collisions with obstructions (usually parked vehicles) at 13%. With respect to the

¹ The total number of crashes has been adjusted so that crashes that involved multiple inside the vehicle distraction sources have only been counted once.

open road (100km/h speed limit) the typical crash involved was lost control on the straight (32%) or lost control while cornering (36%).

In terms of the type of passenger involved (Table 6), 16% were adult/s (over 25 years of age), 26% were young adult/s or teenagers (defined as age 13-25), 34% were children (defined as age up to 13 and/or where reference to a child/daughter/son was made by the driver and the passenger was clearly not an adult) and for 24% insufficient detail was provided to establish which passenger was involved or how old they were. In terms of the behaviours involved in passenger related distraction crashes, the two most common were conversation (33%) and looking at or attending to (35%). Where children were the passenger involved, in approximately 66% of the crashes the behaviour involved the driver looking at or attending to the one or more children.

Table 6. Summary of behaviour and passengers for passenger involved distraction crashes in 2002 and 2003

Behaviour involved	Number of crashes (%)	Type of passenger involved	Number of crashes
Arguing	24 (11%)	Adult/s	9
		Young adult/s and/or teenager/s	10
		Insufficient detail	5
Conversation	73 (33%)	Adult/s	13
		Young adult/s and/or teenager/s	23
		Children	12
		Insufficient detail	25
Interference (accidental)	12 (5%)	Adult/s	1
		Young adult/s and/or teenager/s	4
		Children	1
		Insufficient detail	6
Looking at/attending to	79 (35%)	Adult/s	8
		Young adult/s and/or teenager/s	15
		Children	46
		Insufficient detail	10
Other behaviours	6 (3%)		
Suspected passenger involvement	23 (10%)	Adult/s	3
		Young adult/s and/or teenager/s	5
		Children	10
		Insufficient detail	5
Non-specific passenger involvement	6 (3%)		
Total involvement	223		

The contribution of other crash factors in addition to driver distraction such as alcohol and speed was also investigated. For passenger distraction crashes, alcohol was suspected or

the driver had an alcohol level over the limit of 80mg/100ml (or refused to take a test) in 29 crashes (13%). A further eight drivers had alcohol levels under the limit, and for four drivers the alcohol test result was unknown for some reason. Travelling too fast for the conditions or excessive speed was involved in 18 crashes (8%).

Telecommunications

During 2002 and 2003 telecommunication related devices were involved as a source of distraction in 109 crashes (the second equal highest source of all inside the vehicle crashes at 12%), resulting in 9 fatalities, 20 serious injuries and 130 minor injuries (see Table 4). In terms of the types of devices involved, the majority, 101 were cellphones (of which 11 were identified as texting related), 2 were pagers and 6 were radio-telephones. Table 7 shows that 40% of the telecommunications related distraction crashes involved the driver reacting to an incoming call or message, 35% involved the driver either conversing on the device or using/manipulating the device while driving (i.e. texting or using the menus), and 15% involved the driver either searching for the device to make a call or moving/replacing the device.

In terms of the type of crash involved, 53% occurred on roads with 50-80km/h speed limits, with the typical type of crash evenly spread across accident movement types (Table 5). The top three were rear-ends at 17%, lost control while cornering at 12% and collisions with obstructions (usually parker vehicles) at 12%. For the open road (100km/h speed limit) the typical crash involved lost control while cornering at 53%, with the next highest, lost control on the straight at 15%. With respect to the contribution of other contributing crash factors in telecommunications related driver distraction crashes, alcohol was suspected or the driver has an alcohol level over the limit (or refused to take a test) in 18 crashes (17%). A further seven drivers had an alcohol level under the limit. Travelling too fast for the conditions or excessive speed was only involved in 8 crashes (7%).

Table 7. Summary of behaviour for telecommunication device involved distraction crashes in 2002 and 2003

Behaviour involved	Crash involvement	% of crashes
Conversation	15	14%
Reaching/searching/moving device	16	15%
Reacting to falling/moving stuck device	3	3%
Reacting to incoming call/message	44	40%
Using/manipulating/adjusting device (device in use or dialling but not conversing, includes texting)	23	21%
Suspected telecommunications device	8	7%
Total	109	

Emotionally upset - preoccupied

Table 8 summaries the type of behaviours and objects involved. A total of 39 crashes involved behaviour that was not related to driver distraction and probably not related to driver inattention. These crashes included incidents involving other road users usually of an aggressive nature or fleeing from aggressive acts or intentional collisions by the driver.

There were also a number of crashes where the crash was deliberate, either as an act of aggression or as a probable suicide attempt. Incidents where the person that was emotionally distracted was a pedestrian were also not counted as driver distraction.

Table 8. Summary of emotionally-upset involved crashes in 2002 and 2003

Object source	Behaviour involved	Number of crashes	Proportion of crashes
<i>Possible driver distraction</i>			
Driver	Stress-pressure	31	34%
	preoccupied	4	4%
	Upset	2	2%
	Suspected upset or stress		
Incident occurred immediately prior to driving	Upset	52	57%
	Suspect upset or stress	2	2%
<i>Sub-total - distraction</i>		91	70%
<i>Not a driver distraction issue</i>			
Driver	Upset – intentional collision	5	
Incident occurred immediately prior to driving	Upset – intentional collision	4	
Incident involving other road user	Arguing, aggressive acts, chasing	12	
	Panic, fleeing	7	
	Intentional collision	7	
Pedestrians		4	
<i>Sub-total distraction</i>	<i>not</i>	39	30%
Total		130	

The remaining 91 crashes involved either incidents that occurred immediately prior to driving (usually a domestic argument), where one of the participants chose to drive or crashes where the driver was in a stressed or preoccupied state but there was no clear pre-cursor incident prior to driving. These crashes are inattention crashes but there is potential for debate over whether they are related to driver distraction. With these comments in mind, for the purposes of this project, these crashes have been included as driver distraction crashes. Thus emotionally upset-preoccupied as a source of distraction in 2002 and 2003 was involved in 91 crashes (10% of the total inside the vehicle distraction crashes) resulting in 6 fatalities, 20 serious injuries and 85 minor injuries (Table 4).

Approximately 59% of these crashes occurred on roads with 50-80km/h speed limits (Table 5). For all speeds zones the typical crash involved loss of control while cornering (45%) or loss of control on the straight (23%). A high proportion of these crashes also involved alcohol and speed as contributing factors. Alcohol was suspected or the driver had an alcohol level over the limit (or refused to take a test) in 31 crashes (34%), a further 14 drivers (15%) with an alcohol level under the limit and for seven drivers the result of the test was unknown for some reason. Travelling too fast for the conditions or excessive speed was involved as a contributing factor in 27 crashes (30%).

Table 9. Summary of typical crash movement codes involved in crashes associated with entertainment systems, vehicle controls/devices and smoking sources of inside the vehicle driver distraction for roads (50-80km/h speed limits) and open (100km/h speed limit) roads.

Type of crash	Entertainment systems			Vehicle controls/devices			Smoking		
	Urban	Open	Total	Urban	Open	Total	Urban	Open	Total
Overtaking and lane change	1		1						
Head on	5	6	11	4	6	10	3	1	4
Lost control – straight	8	17	25	5	7	12	5	7	12
Lost control – cornering	7	15	22	9	11	20	6	12	18
Collision with obstruction	8		8	11		11	3		3
Rear end	8	1	9	9	4	13	4	1	5
Turning versus same direction	8	2	10	5		5	1		1
Crossing (no turns)	8		8	3		3	1		1
Crossing (vehicle turning)	4		4						
Merging									
Right against turn	1		1				1		1
Manoeuvring	1		1						
Pedestrian crossing road	3		3				1		1
Pedestrians other				1		1			
Miscellaneous									
Total (crash involvement)	62	41	103	47	28	75	25	21	46

Note: A summary of the crash movements is provided in the Appendix.

Entertainment systems

During 2002 and 2003 entertainment systems or devices were a source of distraction in 103 crashes (12% of all inside the vehicle distraction crashes) resulting in 17 serious injuries and 125 minor injuries (Table 5). In terms of the behaviour involved the vast majority (92%) involved the driver using/manipulating or adjusting the controls associated with the system or the cassettes/CDs associated with the entertainment system. More precision on the specific type of object involved was not conducted due to imprecision in the use of language in the crash reports. For example, different terms were often used to refer to the same incident in the same crash report.

Approximately 60% of these crashes occurred on roads with 50-80km/h speed limits (Table 9) where the type of crash tended to be spread evenly across crash types. For example, loss of control and the straight, collisions with obstructions usually parked vehicles, rear-ends, and most intersection crash types were all involved in around 12-13% of crashes each. However, on the open road (100km/h speed limit) the typical crash was loss of control on the straight (41%) or while cornering (37%). Relatively few of these crashes involved other contributory factors such as alcohol or speed. The driver had an alcohol level over the limit (or refused to take a test) in 8 crashes (8%), while four drivers returned results that were under the limit, and for two driver the results of the test were unknown. Travelling too fast for the conditions or excessive speed was involved as a contributing factor in 12 crashes (12%).

Table 10. Summary of objects and behaviours for vehicle control/devices distraction crashes in 2002 and 2003

Specific object involved	No of crashes	%	Behaviour involved	No of crashes
Environment or climate controls	15	20%	Using, manipulating or adjusting	15
Mirrors, windscreen, windows, doors etc	17	23%	Physically using, manipulating or adjusting Reacting to opening or stuck device	15 2
Seat-belt	12	16%	Putting on or adjusting	12
Speedometer or gauges	13	17%	Looking at or attending to	13
Other vehicle controls or devices (gears, switches, other controls etc)	18	24%	Looking at or attending to Using, manipulating or adjusting Other	4 12 2
Total	75			

Table 11. Summary of typical crash movement codes involved in crashes associated with personal effects, food and drink, and general distraction sources of inside the vehicle driver distraction for roads (50-80km/h speed limits) and open (100km/h speed limit) roads.

Type of crash	Personal effects			Food-drink			General distraction		
	Urban	Open	Total	Urban	Open	Total	Urban	Open	Total
Overtaking and lane change		1	1	1		1			
Head on	5	2	7	3	2	5	1	3	4
Lost control – straight	11	10	21	7	14	21		4	4
Lost control – cornering	7	8	15	4	15	19	5	8	13
Collision with obstruction	6	1	7	8		8	4		4
Rear end	12	4	16	6	1	7	14	3	17
Turning versus same direction	10		10	2	1	3	3	1	4
Crossing (no turns)	3		3						
Crossing (vehicle turning)	1		1				1		1
Merging	1		1						
Right against turn				1		1			
Manoeuvring	1		1						
Pedestrian crossing road							1		1
Pedestrians other									
Miscellaneous	1		1						
Total (crash involvement)	58	26	84	32	33	65	29	19	48

Note: A summary of the crash movements is provided in the Appendix.

Vehicle controls/devices

During 2002 and 2003 vehicle controls and devices were involved as a source of distraction in 75 crashes (8% of all inside the vehicle driver distraction crashes) resulting in 2 fatalities, 22 serious injuries and 91 minor injuries (Table 4). Environment or climate controls were involved in 20% of these crashes, physical adjustment of mirrors, physically wiping windscreens/windows or winding down a window or closing doors in 23%, adjusting or putting on the seat-belt in 16%, looking at the speedometer or other gauges in 17% and other vehicle controls or devices (such as gears, switches) in 16% (Table 10).

Approximately 63% of these crashes occurred on roads with 50-80km/h speed limits (Table 9) where the typical crash involved collisions with obstructions usually parked vehicles (23%), rear-ends (19%) and loss of control while cornering (19%). On the open road (100km/h speed limit) 39% of the crashes involved loss of control while cornering. Other contributing factors such as alcohol in these crashes was very low and travelling too fast for the conditions or excessive speed was involved in 8 crashes (11%).

Smoking

During 2002 and 2003 smoking was involved as a source of distraction in 46 crashes (5% of all inside the vehicle distraction crashes) resulting in 12 serious injuries and 57 minor injuries (Table 4). The behaviours involved were reaching/searching for or moving a lighter/smoke/cigarette in 22 crashes (48%), reacting to a dropped lighter or cigarette while in use in 12 crashes (26%) and either in the process of lighting a smoke or smoking in 12 crashes (26%). Overall the typical crash involved loss of control while cornering (39%) or while on a straight (26%) (Table 9). A total of 10 drivers (22%) were suspected of alcohol or had an alcohol level over the limit (or refused to take a test) while a further five drivers results were not known for some reason.

Personal Effects

Personal effects were involved as a source of distraction in 84 crashes (9% of all inside the vehicle distraction crashes) in 2002 and 2003 resulting in 14 serious injuries and 93 minor injuries (Table 4).

The typical behaviours involved (Table 12) were reaching/searching for or moving a personal effect item (36%), often located on the front passenger seat, or reacting to a falling or moving/shifting or stuck personal effect item (32%), usually unsecured falling/shifting items often on the front passenger seat. Over two thirds (69%) of these crashes occurred on roads with 50-80km/h speed limits (Table 11), where 21% were rear-ends, 19% loss of control on a straight and 17% turning versus the same direction at an intersection. On the open road (100km/h speed limit) the typical crash involved loss of control on the straight (38%) and while cornering (31%). Very few of these crashes involved alcohol or travelling too fast for the conditions or excessive speed as additional contributing factors.

Table 12. Summary of behaviour and objects involved in personal effects distraction related crashes in 2002 and 2003

Behaviour involved	No crashes	%	Specific object involved	No crashes
Looking at/attending to an object	16	19%	Bags, wallets, boxes, etc	1
			Clothing, shoes, glasses	1
			Documents, books, docketts	14
Reaching, searching for or moving an object	30	36%	Bags, wallets, boxes, etc	20
			Clothing, shoes, glasses	5
			Documents, books, docketts	5
Reacting to falling, shifting or stuck object	27	32%	Bags, wallets, boxes, etc	14
			Clothing, shoes, glasses	8
			Documents, books, docketts	5
Using, manipulating or adjusting an object	9	11%	Bags, wallets, boxes, etc	2
			Clothing, shoes, glasses	7
Suspected involvement	2	2%	Bags, wallets, boxes, etc	1
			Clothing, shoes, glasses	1
Total	84			

Food-Drink

Food and drink were a source of distraction for 65 crashes (7% of all inside the vehicle crashes) in 2002 and 2003 resulting in 4 fatalities, 10 serious injuries and 74 minor injuries (Table 4). The driver was reaching/searching for or moving food or drink items in 26 crashes (40%), consuming, unwrapping/opening the food or drink item in 17 crashes (26%), reacting to a falling/shifting food-drink item in 12 crashes (18%), reacting to a dropped or spilt food-drink item when being consumed or unwrapped/prepared in 7 crashes (11%) and food-drink distraction was suspected in 3 crashes (5%). Roughly half of these crashes (49%) occurred on roads with 50-80km/h speed limits. Overall, a typical crash involved loss of control either on a straight (32%) or while cornering (29%) (Table 11). Very few of these crashes involved alcohol or travelling too fast for the conditions or excessive speed as additional contributing factors.

Animal or insect inside vehicle

Animals or insects inside the vehicle were involved in 36 crashes (4% of all inside the vehicle distraction crashes) in 2002 and 2003 resulting in 3 serious injuries and 28 minor injuries (Table 4). They typically involved either domestic animals (in each case an unrestrained dog

except for one crash that involved a pet bird) (56%) or insects typically flying through an open window or mosquitoes in the vehicle (44%) (Table 13).

Table 13. Type of animal and behaviour involved in animal/insect inside the vehicle distraction crashes in 2002 and 2003

Animal involved	No. crashes	% crashes	Behaviour involved	No. crashes
Domestic animal/s	20	56%	Interference of driving task by animal	8
			Driver looking at, attending to animal	8
			Reacting to/swiping at	1
			Unclassified	3
Insect/s	16	44%	Reacting to/swiping at	15
			Unclassified	1
Total	36			

The type of crashes involved were 11 lost control while cornering, 9 lost control on the straight, 6 head-on, 4 rear-ends, and 6 were shared amongst the other movement code types. Very few of these crashes involved alcohol or travelling too fast for the conditions or excessive speed as additional contributing factors.

Sneezing-coughing-itching

A small number of crashes (12, 1% of all inside the vehicle crashes) involved the driver being distracted by a sneezing or coughing fit, itching body parts or performing a stretching exercise. There are two few crashes involved to provide any further analyses.

General Distraction

Under the CAS cause code analysis there were a considerable number of crashes (181 in total) coded under '350: Attention diverted by'. This code was analysed further for content. For a total of 48 crashes (5% of the total of all inside the vehicle crashes) there was sufficient information to code the source of the distraction as inside the vehicle but not enough information to classify them any further. These crashes have been labelled as 'General distraction – inside the vehicle'. These 48 crashes resulted in 2 fatalities, 8 serious injuries and 56 minor injuries (Table 4). The pattern of crash movements involved (Table 11) suggests that these crashes were not markedly different from those of the other inside the vehicle distraction sources. Overall the typical crash involved was rear-ends (35%) and lost control while cornering (27%). Very few of these crashes involved alcohol or travelling too fast for the conditions or excessive speed as additional contributing factors.

Analysis of fatal crashes

The 26 fatal inside the vehicle distraction crashes were examined to see whether they occurred in conjunction with alcohol, speed or fatigue related contributory causes. Table 14 shows that alcohol, fatigue and too fast for the conditions or excessive speed was involved in 18 (69%) of the crashes. The majority (77%, 20 out of 26) of the fatal crashes also occurred on the open road (100km/h speed limit). Given the typical crash movements involved in these inside the vehicle distraction crashes (tendency to lost control on straight or corner), the probability of higher impact speeds and the involvement of other driver impairment causes, fatal crashes under these circumstances are not surprising.

Table 14. Involvement of alcohol, speed and fatigue contributing causes in fatal inside the vehicle distraction related crashes in 2002 and 2003

Alcohol involvement (limit is 80mg/100ml)	Involvement of other causes	Number of crashes
Alcohol level below limit	Alcohol only	7
	Alcohol and fatigue	1
	Alcohol and too fast for conditions	4
Alcohol level above the limit	Alcohol only	1
	Alcohol and too fast for the conditions	4
Too fast for the conditions	Too fast for the conditions only	1
Total involvement		18

Discussion

In terms of the crash totals only, there was a relatively close match between the CAS cause code analysis and the crash report analysis for inside the vehicle sources of distraction. The closeness of the match depends to a large degree on whether the source of inattention – emotionally upset/preoccupied – is considered to be driver distraction or not. However, the specific sources of inside the vehicle distraction do not match well between the two approaches and approximately 15% of the crashes are in disagreement in terms of coding. If it is important to discuss the relative contributions of different inside the vehicle distraction sources, then the crash report analysis results are preferred.

Overall, for the two years (2002 and 2003) driver distraction appears to be involved in at least 10% of all crashes in New Zealand. There appears to be a relatively even split between inside the vehicle distractions (44%) and outside the vehicle distractions (46%) with the

remaining 10% being crashes with multiple distraction causes or crashes with insufficient information to categorise further.

Based on the crash report analysis the inside the distraction sources can be ranked on the basis of involvement in crashes:

<i>Distraction Source</i>	<i>Proportion of inside the vehicle distraction crashes</i>
1. Passengers	25%
2. Telecommunications	12%
3. Entertainment systems	12%
4. Emotionally upset-preoccupied	10%
5. Personal effects	9%
6. Vehicle controls/devices	8%
7. Food-drink	7%
8. Smoking	5%
9. Animal or insect in vehicle	4%
10. Sneezing/coughing/itching	1%
11. General distraction – inside the vehicle	5%

If telecommunications, entertainment systems and vehicle control/devices distractions are considered to be predominately technology based distractions, then approximately 32% of inside the vehicle distractions involved technology in some manner. The majority of inside the vehicle distractions appear to be a related to everyday objects (personal effects, food and drink, cigarettes) brought into the vehicle as part of vehicle travel or for specific vehicle travel purposes, passengers, emotional 'baggage' that the driver brings with them and other activities (stretching, itching etc) that drivers get up to as part of driving.

Overall there was a tendency for more inside the vehicle distraction related crashes to occur on roads with 50-80km/h speed limits (60% on 50-80km/h, 40% on 100km/h speed limit roads). For crashes on the open road (100km/h) the typical crash associated with inside the vehicle distractions was loss of control, either on the straight or while cornering. With respect to 50-80km/h speed zones, which tend to be more urbanised, the type of crash was spread reasonably evenly over a number of crash types, such as rear-ends, loss of control, collisions with obstructions (usually parked vehicles) and turning versus the same direction at intersections.

The involvement of other contributing crash factors such as alcohol, speed and fatigue was also investigated. Overall, alcohol was the main factor that also turned up in specific inside the vehicle distractions. Alcohol was highly involved when the distraction was emotionally upset-preoccupied (34% of the drivers had levels over the legal limit or suspected) and travelling too fast for the conditions or excessive speed was involved 30% of the time. Given the context of the events that lead up to typical crashes under this code this finding is not surprising. However, alcohol involvement (drivers with alcohol levels over the limit or suspected) was also related to telecommunications related distraction crashes (17% of these drivers), as was passenger/s related distractions (13% of these drivers) and smoking related distractions (22% of these drivers). It seems likely that the combination of alcohol and using a telecommunications device, smoking or dealing/conversing with passengers places

additional strain on the drivers resources and/or the presence of alcohol may mean that the driver is more likely to combine activities that they might not otherwise have.

It is important to note that this study is only reporting on the frequency of crashes and the involvement of driver distraction sources based on the information contained in police report crashes. This information does not comment or provide information on how risky a particular behaviour might be or on how prevalent the behaviour is (other than when a crash occurs which is attended by the police).

On the basis of the analysis of the CAS cause codes and the level of matching between the two approaches, it seems that there is the potential to consider redesigning, defining or adding to the eleven CAS cause codes to improve their utility for assessing driver distraction issues. At present the 358 code appears to be trying to capture too many objects and/or behaviours, while the role of other codes where there are very few crashes recorded such as 356 could be re-considered. They might be better placed within another code to free up coding space or they could be investigated further to see why they are under-utilised.

Further work on the data analysis is to complete the crash report analysis of the 2002 and 2003 data for the outside the vehicle distraction codes. Once that is completed, some sampling of other inattention codes that are not directly related to driver distraction could be examined to provide an indication of their driver distraction related content.

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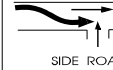














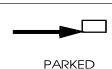
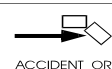

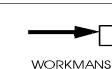
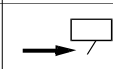
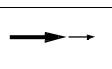
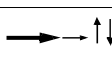
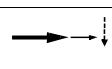
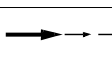
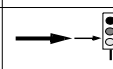
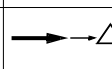
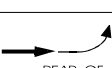
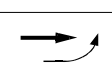
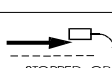
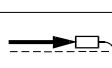
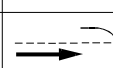

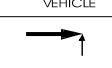
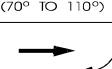
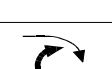

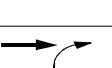




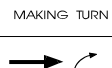
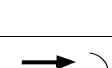
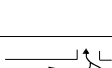




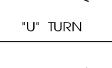
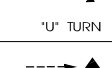





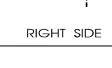
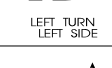



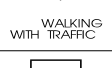






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Appendix: CRASH MOVEMENT CLASSIFICATION DIAGRAM

	TYPE	A	B	C	D	E	F	G	O
A	OVERTAKING AND LANE CHANGE	 PULLING OUT OR CHANGING LANE TO RIGHT	 HEAD ON	 CUTTING IN OR CHANGING LANE TO LEFT	 LOST CONTROL (OVERTAKING VEHICLE)	 SIDE ROAD	 LOST CONTROL (OVERTAKEN VEHICLE)	 WEAVING IN HEAVY TRAFFIC	OTHER
B	HEAD ON	 ON STRAIGHT	 CUTTING CORNER	 SWINGING WIDE	 BOTH OR UNKNOWN	 LOST CONTROL ON STRAIGHT	 LOST CONTROL ON CURVE		OTHER
C	LOST CONTROL OR OFF ROAD (STRAIGHT ROADS)	 OUT OF CONTROL ON ROADWAY	 OFF ROADWAY TO LEFT	 OFF ROADWAY TO RIGHT					OTHER
D	CORNERING	 LOST CONTROL TURNING RIGHT	 LOST CONTROL TURNING LEFT	 MISSED INTERSECTION OR END OF ROAD					OTHER
E	COLLISION WITH OBSTRUCTION	 PARKED VEHICLE	 ACCIDENT OR BROKEN DOWN	 NON VEHICULAR OBSTRUCTIONS (INCLUDING ANIMALS)	 WORKMANS VEHICLE	 OPENING DOOR			OTHER
F	REAR END	 SLOW VEHICLE	 CROSS TRAFFIC	 PEDESTRIAN	 QUEUE	 SIGNALS	 OTHER		OTHER
G	TURNING VERSUS SAME DIRECTION	 REAR OF LEFT TURNING VEHICLE	 LEFT SIDE SIDE SWIPE	 STOPPED OR TURNING FROM LEFT SIDE	 NEAR CENTRE LINE	 OVERTAKING VEHICLE	 TWO TURNING		OTHER
H	CROSSING (NO TURNS)	 RIGHT ANGLE (70° TO 110°)							OTHER
J	CROSSING (VEHICLE TURNING)	 RIGHT TURN RIGHT SIDE		 TWO TURNING					OTHER
K	MERGING	 LEFT TURN IN	 RIGHT TURN IN	 TWO TURNING					OTHER
L	RIGHT TURN AGAINST	 STOPPED WAITING TO TURN	 MAKING TURN						OTHER
M	MANOEUVRING	 PARKING OR LEAVING	 "U" TURN	 "U" TURN	 DRIVEWAY MANOEUVRE	 PARKING OPPOSITE	 ANGLE PARKING	 REVERSING ALONG ROAD	OTHER
N	PEDESTRIANS CROSSING ROAD	 LEFT SIDE	 RIGHT SIDE	 LEFT TURN LEFT SIDE	 RIGHT TURN RIGHT SIDE	 LEFT TURN RIGHT SIDE	 RIGHT TURN LEFT SIDE	 MANOEUVRING VEHICLE	OTHER
P	PEDESTRIANS OTHER	 WALKING WITH TRAFFIC	 WALKING FACING TRAFFIC	 WALKING ON FOOTPATH	 CHILD PLAYING (TRICYCLE)	 ATTENDING TO VEHICLE	 ENTERING OR LEAVING VEHICLE		OTHER
Q	MISCELLANEOUS	 FELL WHILE BOARDING OR ALIGHTING	 FELL FROM MOVING VEHICLE	 TRAIN	 PARKED VEHICLE RAN AWAY	 EQUESTRIAN	 FELL INSIDE VEHICLE	 TRAILER OR LOAD	OTHER

PRESENTATION SLIDES

Distraction Related Crashes in New Zealand



Dr Craig Gordon
Senior Scientist
Ministry of Transport

Ministry of Transport

Presentation Content

Comments on approach and the contributory factor codes ('cause codes') examined

- Comments on a potentially problematic contributory factor code
- Overview of distraction crash involvement
- Overview of inside the vehicle distractions and objects, behaviours involved
- Summary comments

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Analysis Comments

- Examined 2 years of police reported crash data from the CAS system (2002-2003)
- Two basic approaches:
 1. CAS Contributory Factor Analysis
 - ~ the 'Attention diverted by' codes were the best match
 - ~ review of crash reports for fine level detail
 2. Review of Crash Reports
 - ~ developed classifications for object and behaviour coding for inside the vehicle distractions
 - ~ reviewed all inside the vehicle distraction related codes

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CAS 'Cause Codes' - Distraction

350: Attention diverted by

- | | | |
|---|---|---------------------------|
| <ul style="list-style-type: none">• 351: Passengers• 354: Animal, insect inside vehicle• 358: Cigarette, radio, glove box etc• 359: Cell-phone or communication device• 357: <i>Emotionally upset</i> | } | Inside
the
Vehicle |
| <ul style="list-style-type: none">• 352: Scenery or persons outside vehicle• 353: Other traffic• 355: Trying to find destination/place• 356: Advertising or signs• 360: Driver dazzled | } | Outside
the
Vehicle |

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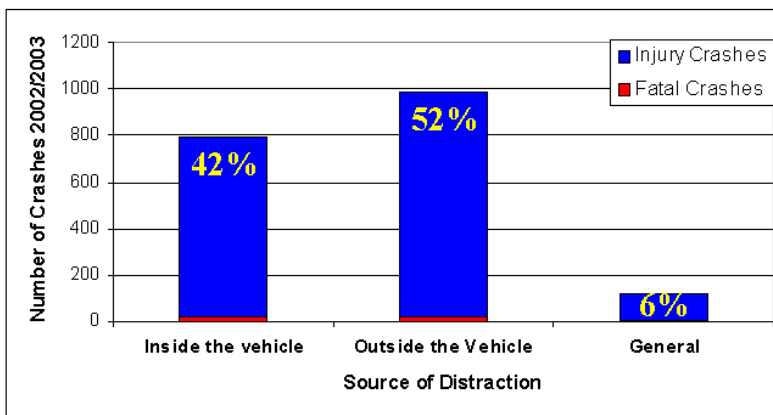
Emotionally Upset - Distraction?

Identified as a potentially problematic contributory factor. It contained:

- 130 crashes (where passengers were not the source)
- 39 crashes were clearly not driver distraction and probably not driver inattention
- 91 crashes qualified as driver inattention, but might not qualify as driver distraction
- Of these the driver was:
 - ~ upset/angry in 61%
 - ~ stress-pressure-preoccupied in 34%

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Estimating Involvement - CAS



Distraction: 9% of all crashes in 2002-2003

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Inside the Vehicle Distractions

Source - Object	% Involvement
1. Passengers	28%
2. Telecommunications	14%
3. Entertainment systems	13%
4. Personal effects	11%
5. Vehicle controls/devices	9%
6. Food-drink	8%
7. Smoking	6%
8. Animal/insect in vehicle	5%
9. Driver – Sneezing/itching etc	1%
10. General inside vehicle	6%

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Technology Distractions

Source - Object	% Involvement
Technology Based Distractions	
2. Telecommunications	14%
3. Entertainment systems	13%
5. Vehicle controls/devices	9%
	36%
Non-Technology Based Distractions	
Passengers, food/drink, smoking etc	58%
General Inside Vehicle Distraction	6%

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Crash Involvement

<u>Inside Distraction Source</u>	<u>Crashes (Worst Injury)</u>	
	<u>Fatal</u>	<u>Serious</u>
1. Passengers	8	53
2. Telecommunications	7	14
3. Entertainment systems		15
4. Personal effects		13
5. Vehicle controls/devices	2	18
6. Food-drink	3	8
7. Smoking		10
8. Animal/insect in vehicle		3
9. Driver – Sneezing/itching		1
10. General inside vehicle	1	7
11. Driver – Upset or stress	6	18

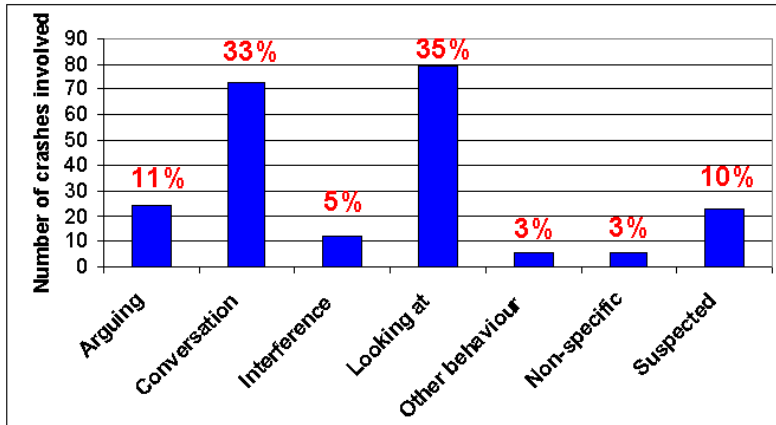
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Inside the Vehicle Distractions

<u>Source - Behaviour</u>	<u>% Involvement</u>
1. Using, manipulating, adjusting	26%
2. Looking at/attending to	19%
3. Reaching, searching or moving	13%
4. Conversation	11%
5. Reacting to falling/shifting item	6%
6. Reacting to incoming phone call	6%
7. Reacting to interference	4%
8. Arguing with passenger	3%
9. Spilt/dropped item in use	3%
10. Other behaviour or not classified	9%

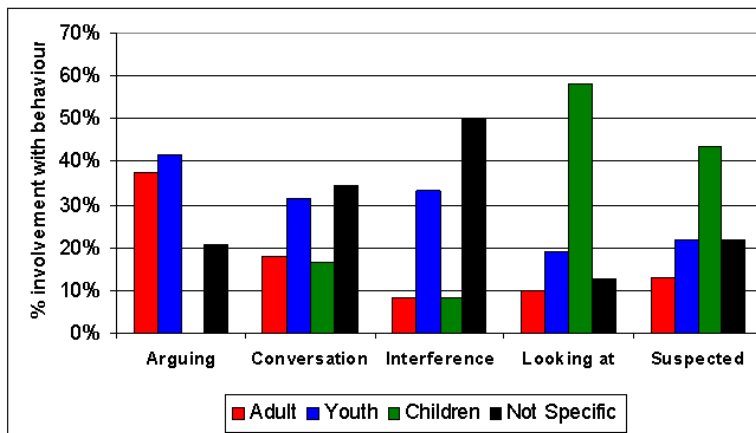
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Passengers – Behaviour Involved



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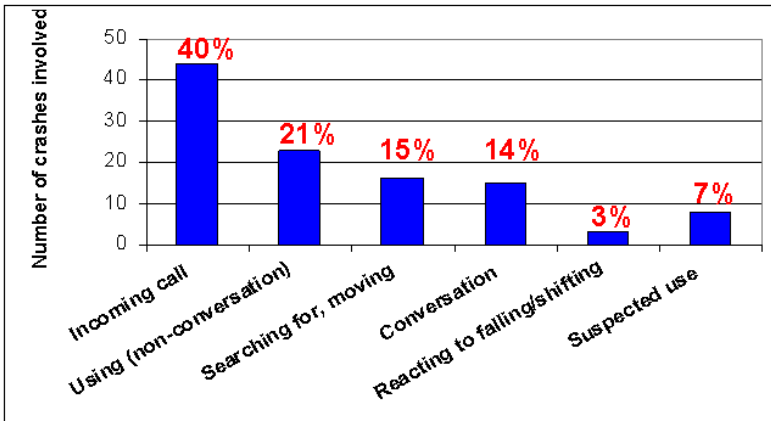
Passengers – Type Involved



6% remainder: other behaviour or non-specific

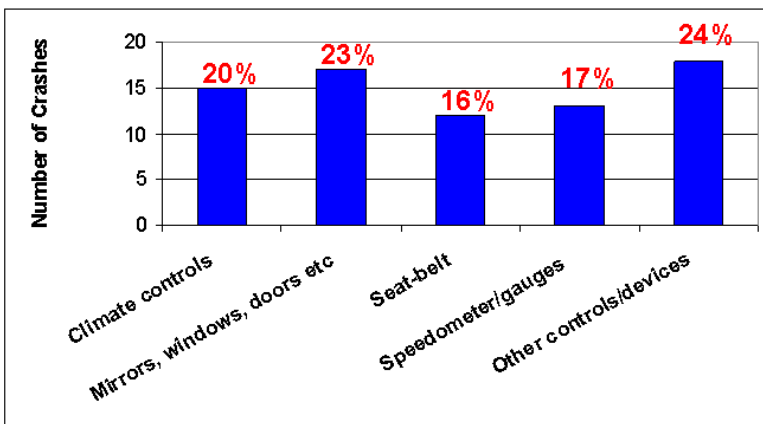
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Telecommunications - Behaviour



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Vehicle Controls/Devices



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Summary Comments

In terms of the two approaches used:

- Reasonable agreement between CAS code analysis and crash report analysis at the level of overall totals
- However considerable disagreement at the level of specific inside the vehicle distraction sources
- Some of the CAS codes are over utilised while some are under utilised

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Summary Comments

The current information suggests that in New Zealand during 2002 and 2003:

- Driver distraction was involved in 1897 crashes
~ approximately 9% of all crashes
- Overall there were (worst injury sustained):
 - ~ 46 fatal crashes
 - ~ 320 serious injury crashes
 - ~ 1531 minor injury crashes
- In terms of overall source of the distraction:
 - ~ 42% were inside the vehicle
 - ~ 52% were outside the vehicle
 - ~ 6% were undetermined

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Summary Comments: continued

Top three inside the vehicle distraction sources were:

Passengers	28%
Telecommunications	14%
Entertainment systems	13%

• Top three inside the vehicle distraction behaviours were:

Using, manipulating, adjusting	26%
Looking at/attending to	19%
Reaching, searching, moving	13%

• Technology based distractions were 36% of inside the vehicle distractions

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Summary Comments: continued

Where to now?

- Consider revising the eleven 'attention diverted by' cause codes used for CAS
- Finish analysis of outside the vehicle distractions to complete the 'picture' for 2002 and 2003
- May consider reviewing samples of some of the other inattention related cause codes for driver distraction issues