Submissions received on Banks Peninsula speed review, February 2021

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Organisations

Submission ID	Road name/s	Comments	Any further comments	Name	Name of organisation and role
38141	All areas	Letter attached		Harry	Akaroa Ratepayers & Residents Association Inc - President
37027	Lower Waipapa Avenue, Marine Drive Charteris Bay	The Diamond Harbour Community Association supports the reduction of speed in Lower Waipapa Avenue and at Charteris Bay. While lower speed limits do not necessarily deter reckless and speeding drivers, they help establish a pattern of behaviour which the majority abide by. Lower Waipapa Avenue We see the significant safety issues in Lower Waipapa Avenue as being the intersections; tight corners with poor visibility; multiple/concurrent pedestrian/parking/driving movements outside the shops, hall and wharf; periodic congestion; and the narrow road down to the wharf blocked by parked cars. The pedestrians often include children and less-able people. The vehicles include cyclists, motorbikes and all sizes of cars. A significant risk is the tendency of some drivers while picking up/dropping-off people at the ferry, to speed through these hazards. The road to the hall, in front of the shops and down to the wharf all need a significant reduction in speeds and one consistent speed limit. The starting point for the speed reduction should be on the upper side of the intersection with the Hall road where it has been proposed that traffic calming should be installed. We support these traffic calming measures as they are part of the 2017 Village Development Concept Plan and an important feature to complement signage, in reducing driving speed.Currently the lower Stoddart Point domain and cemetery road has a speed limit of 20kph. We strongly support the whole area down from the Hall/Waipapa junction being 20kph. If this is deemed unacceptable, then select 30kph, and that may as well include the lower domain, as there is no reason why it is more hazardous, than the areas down to the wharf, in front of the shops and in front of the Hall. 40kph is much too high and unlikely to induce a change in driver behaviour as it is too close to 50kph. Would 40kph be an acceptable speed in front of the hall, shops and wharf? We think not. The area of Lower Waipapa Ave between the triangle and the Hall/Waipapa junction can stay at 50kph, but the addition of traffic markings indicating the coming speed reduction would be beneficial. The road is wide and while pedestrians do walk up the north-west side where there is currently no footpath, there is enough space for safety. Charteris Bay We support a speed limit reduction to 50kph from the beginning of Charteris Bay, to the current 50kph sign. The area has houses on Charteris Bay; a well-used		Richard	Diamond Harbour Community Association - Committee member with delegated authority to make this submission

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		intersection at the Orton Bradley park entrance; the intersection with Andersons Bay; and a considerable number of pedestrians walking the waterfront roadside verge between Orton Bradley park and the boat ramp area. These interactions justify a lower speed consistent with the 50 kph speed limit through northern Charteris Bay and Church Bay.			
36817		I would like to see some real world data around accident and injury rates and the causes of these accidents before any time or money is spent on this endeavour. It is not enough to state that speed equals damage; we all know that. We need to see that there will be real, not theoretical gains from this proposal.		Michael	Dataco
37849	akaroa highway	We Understand there is talk about reducing the speed limits from little river to Akaroa. This road is in pour condition and the money would be better spent to upgrade it. if the limits are reduced the tourist traffic to Akaroa will be greatly reduced. If the current covid impact is not already enough this could finish it. I travel there weekly for a Sunday coffee with friends. We would defiantly stop this. Our cars are improving so why lower the limit. it will then create impatient drivers to pass in dangerous places.		Glenn	Ducati owners South - President
36736	Godley Quay	My concern is that the reduction in speed limits across the region is not reflective of wanting to increase road safety, but to reduce the council / government spend on road maintenance and road safety improvements. In between the Lyttetlon sports field / Rugby field and the Tunnel there are three separate areas that need urgent attention. Crest of hill after Voelas Road heading to Dry Dock (off camber and bumpy road surface) Outside the dry dock (road surface breaking up) Godley Quay in between George Seymour Quay and Charlotte Jane quay (patchwork of different road surfaces) Considering the volume of traffic using Godley Quay it's a poor refection on roading priorities.		Clinton	Stark Bros Ltd - Transport Manager

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Submission ID	Road name/s	Comments	Any further comments	Name	Name of organisation and role
36800	Marina Accessway	Any reason why this road is not shown up on the interactive map as becoming 40km/h? As this is perhaps the worst piece of road in Lyttelton and the haven of the boy racers its omission is interesting to say the least.		Richard	Naval Point Club Lyttelton - Club Manager
36828	All of the above	On behalf of our members, Cycling Action Network (CAN) supports lowering speed limits as proposed, because it will make walking and cycling safer and more pleasant. Lowering operating speeds and speed limits will: - improve safety for all road users (not just cyclists) - encourage more people to cycle - make these roads quieter and more pleasant - have little or no effect on vehicle journey times - be consistent with NZ's road safety policy Reducing motor vehicle speeds will have two benefits for pedestrians and cyclists: - People struck by motor vehicles at lower speeds will be less likely to be killed or seriously injured, - the chances of them being struck will be reduced as motorists have more chance to avoid hitting them, when travelling at lower speeds. For every 1km/h we lower the speeds, we can expect a two to three percent reduction in the number of crashes. References https://www.transport.govt.nz/area-of-interest/safety/road-to-zero/ https://can.org.nz/article/down-with-speed ACC - Down With Speed (attached)	About CAN CAN is New Zealand's national network of cycling advocates. We work with government, local authorities, businesses and the community on behalf of cyclists, for a better cycling environment. CAN's goals are to: Promote the benefits of cycling Improve safety for cyclists Encourage the creation of a good cycling environment Advocate for integrated cycle planning Increase the number of cyclists on our roads. CAN was formed in 1997 as New Zealand's national network of cycling advocate groups. It is the national voice for everyday people on bicycles - recreational, commuter and touring.	Patrick	Cycling Action Network Inc - Project Manager

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Submission ID	Road name/s	Comments	Any further comments	Name	Name of organisation and role
36790	Wharf Road	I have a house on Wharf Road between the junction of Pigeon Bay Road and the wharf. This is a very popular walking route, in fact it there are more pedestrians on this road than cars. There are no foot paths on this road and there are 2 blind corners, there are also two exits from the camp ground where there has been a serious accident.	There is also a boat launching ramp where boats and trailers must back across the road to launch. This is a particularly dangerous area where there are also a lot of children playing in and around boat houses, I have seen vehicles come through this area at 50km/hr (which is the speed limit) I recommend a limit of 30km hour from the bridge and 5km from the camp ground to the wharf.	Vincent	Pigeon Bay Boating Club - Commodore

Residents

Submission ID	Which area are you commenting on	If commenting on more than one area, please list them below	Road name/s	Comments	Any further comments	Name
37930	Akaroa	Commenting on all areas		Waste of money. The vast majority of these roads will never be monitored by cops. Reducing the speed limit on all these roads is a complete waste of money and should be fixed on actually fixing damaged roads instead. I'm mostly referring to all the rural roads that you wish to reduce from 100km to 60km. Crashes on these roads rarely happen. Most of these roads are too windy and narrow for cops to remain stationary and catch speeders. Everyone drives to the conditions around all these roads anyway and they are not hot spots for boy racers. People know to slow down around corners and reducing the speeds is just a huge waste of money. You want to reduce about 57 roads from 100km to 60km. Think about how much money you are wasting on the labour to make the signs, get it transported and then have someone put the signs up. You are wasting thousands of dollars on speed limit changes on roads in the middle of nowhere. Do not try to fix an issue when there isn't one. The speed limits on these rural roads are fine. Most of these roads get hardly any traffic besides from the locals, so why bother reducing the speed limits? Everyone drives sensibly and to the conditions of the road anywhere. No need for the Christchurch CIty Council to monitor every little road, spend your roading money on something useful for once.	By all means, reduce the speed limits on the residential roads, but leave these open roads alone.	Jayden

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38077	Akaroa	Diamond Harbour, Lyttelton, Southern Bays, Cass Bay, Charteris Bay, Purau/Port Levy Route, Port Levy/Pigeon Bay rout, Pigeon Bay, Kikipa, Puaha Valley , Little River, Western Valley and Okuiti Valley, Akaroa, Birdlings Flat and Kaitorete Spit		As a long term resident of the Banks Peninsula I see the reduction of speed limits as having a serious adverse affect on the ability of banks Peninsula residents to commute into Christchurch for work or other activities. I am looking for an evidence based solution based on published accident rates as compared with similar roads. And a strong case for very particular speed limit changes where there is clearly an exaggerated problem. This proposal looks very much like a collection of just so stories given the lack of data. From my experience and those overseas it is road quality that it the largest factor (other than speed) in accidents. Can we instead work on the atrocious road quality in the Banks Peninsula? There is no doubt that speed is a factor in all accidents with the trivial outcome being that no speed is acceptable. I am concerned that in many cases we will create criminals out of Banks Peninsula locals who will continue to drive as they have for the reasons that they do now - i.e getting to work on time, with a minimal impact on accidents. In effect creating more social harm than good.		Jasper
38051	Akaroa	Wainui	Wainui Main Road	I would like to see the beach front section of Wainui Main Road reduced to 40kmh in the same way Akaroa is proposed to be. The case to me seems even clearer in Wainui. This is a section of road which directly passes the beach front with no fence or pavement separating parked cars and beach users from 50+kmh traffic. In the summer this area is full of cars, young kids, dogs, picnickers, people unloading paddle boards and kayaks, often standing in in the 50kmh road. These activities should not mix with 50kmh traffic - I think we need a reduced limit and improved signage to prevent a serious accident and likely injury to a beach user. Thanks.	I had heard previously that this speed limit couldn't be reduced as it was a pass through to other peninsula roads, but presumably this is no different to the case in Akaroa.	Nick
38062	Akaroa	Wainui beach area	Wainui Main Road	Please reduce the speed along the beach front section of Wainui Main Road to 40kmh in the same way Akaroa is proposed to be. The case for Wainui IMHO should be stronger than most other regions as this is a section of road that goes right past the beach front and there is no barrier separating parked cars, beach users, and those just going for		Rob

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				walk. There is also a reserve, tables and toilets across the road increasing foot traffic on the road. In the summer this area is very busy with bach owners as well as many many Christchurch residents making a day trip, and it is full of cars and many young children, with people unloading paddle boards and kayaks, often walking along and standing in the road as there really isn't any alternative. It's only a matter of time before a serious accident occurs, please lower the speed limit in this area. Thanks!!		
38054	Akaroa	Wainui Main Road	Wainui Main Road by the beach	Our family has a bach at Wainui and we spend many weekends there. We would like to see the beach front section of Wainui Main Road reduced to 40kmh. During the Summer this area is incredibly busy. There are always people walking across or down the side of the road. There is no fence or pavement, and cars are often parked on the grass with families and children picnicking right next to the road. And to avoid the parked cars it is often necessary to walk very close to the road. The public toilets and reserve are just opposite the beach, across the road, and there is a lot of pedestrian traffic between the beach and the toilets/reserve. A 50km speed limit is not appropriate for this section of road and it is a danger to beach goers.		Lucy
38088	Akaroa		Rue Lavaud, Beach Rd, Rue Balguerie, Rue Benoit, Smith Street, Muter Street, Rue Grehan, Rue Jolie, Woodills Rd, Bruce Terrace, Church St,	I fully support the proposal to reduce Akaroa township speed limits to 40k/h. The roads in particular are the main road, Rue Lavaud, and Beach Road to the monument, and all roads coming off them. High on the priority list of the side roads is Rue Balguerie which also needs yellow no parking lines to at least Muter Street, and Rue Jolie both north and south. Rue Benoit, Smith Street, Selwyn Avenue, Church Street, and Rue Grehan all need to have 40 k/h as well.	I found it very surprising that while we had cruise ships in the town, the big buses were allowed to park on the yellow lines outside the Area School, often making it very dangerous for teachers and parents, dropping children off in the mornings. Thankfully we probably wont be having this happen again.	Carolyn
36726	Akaroa		Central Akaroa	As parts of Beach Road are already 30kph , I feel the whole township should be this speed...not 40kph, as is proposed. 40kph is too fast on many of our narrow and pedestrian busy streets.		David
36705	Akaroa		Rue Benoit	Rue Benoit is a steep street..narrow and no footpaths. I think the speed limit for streets like this...another example is Percy street and Smith street in Akaroa...should be 10 km . Children walking on them, and currently cars and often with boats behind them tear down these streets.I also think the main streets speed limit should be reduced to 30. Thank you for opportunity to comment.		Maryjane

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				Maryjane		
36704	Akaroa		Rue Benoit	No foot path and very narrow with blind access to the road from private drive ways, very dangerous right now especially children. Walking on the road with car passing at 50 k is unacceptable, should be 10 kph	Agree with proposed limits but 10 k on narrow streets with no foot paths	Rob
36670	Akaroa		All narrow akaroa traffic streets	This is of extreme concerns especially the main streets. A 30ks per hour, just absolutely sense before more serious injuries.	Quite clear due to the narrowing with parking. The akaroa streets are not designed for 50ks per hour.	Charl
38039	Akaroa		Rue Balguerie	Rue Balguerie needs the new speed limit also a no parking line on one side of the road. It is so narrow with vehicles parking on each side. Part way up there is no footpath and many people use this to get to the giants house. The buses that come up to giants house cause congestion and it's not safe. We hope the new speed limit can be introduced. Thank you		Beverley
36900	Akaroa		Jubilee Road, Wainui	A change from 100k to 60 k for Jubilee Road would be an improvement but is still well above the speed it's possible to travel safely. Jubilee Road is a steep narrow 4WD road with numerous blind corners and along most of its length a steep drop on the lower side. I would prefer a lower limit and/or additional warning signs. About two years ago I found a carful of young idiots about halfway down Jubilee Road who had come to rest with one wheel in mid air. From the skid marks it was obvious they had been going far too fast and lost control. They were very lucky - no damage done and I towed them back onto the road - but a fraction further and the car would have gone over the edge and rolled.	Thank you for the opportunity to comment.	Katrinka
37342	Akaroa		Rue Balguerie	At last a safer speed for our street! Policing it will be important...		Bryan
37767	Akaroa		Wainui Main Road	Please consider lowering the speed limit for the main Wainui beach area and immediate surrounds. This beach is a popular family destination, with small children close to the road.		Judith
36689	Akaroa		Junction of Okains bay road, SH75 and Totara drive	Reduce speed limit on SH75 in both directions, 200 m before and after this junctiuon. Traffic pulling out from Okains bay road onto SH75 has very poor visibility in either direction - and as a local (Duvauchelle) of only 2 years, I've narrowly missed major accidents at this spot three	Fully support speed restriction in Akaroa itself. Only question might be why isn't down to 30km? With the pavements packed with tourists there is far more call for it than in	Neil

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				times already. All times with motorbikes not looking both ways... (I am aware that CCC doesn't maintain SH. I used to work for NZTA. Lobby them for the change! It is only a matter of time before there's a fatality there).	central CHCH. No one minds going that slowly thru such a pretty town!	
36676	Akaroa		Le Bons Bay Road, Akaroa Summit Road, Le Bons Bay Road.	Due to the numerous hospital appointments in Christchurch for a family member, we travel from Le Bons Bay across the Summit Road to town. We travelled every week day for 2 months recently and were confronted daily by large stock trucks, freight trucks and logging trucks. Many were travelling over the centre line on blind corners, and at high speeds that gave no room for any correction. Many times we were forced into the hill or the scrub to avoid a collision. If they were travelling slower, they would have time to react and pull back onto their side. The roads are too narrow for speed.		Karen
37454	Akaroa		Flea Bay Road, lighthouse Road, Stony Bay Road	The speed limits in place at 100km/h are okay. People exceeding 100km/h are the issue. Township 50 -> 40 is alright.		William
38101	Akaroa		Stoney Bay Road	Hi my name is Matt Butterfield and I own a property at the top of Rue Balguerie Akaroa just before it turns into Stoney Bay Road. I support the proposed speed restrictions and would recommend more signage of the speed limits as a lot of people especially motorbikes speed up the top section of Rue Balguerie which is very dangerous, and continue speeding onto Stoney Bay Road. This road is used heavily by walkers snd cyclists gaining access to the walking tracks up Purple peak road, so slowing traffic is a great plan. While you are at it fix the parking on lower Rue Balguerie by having yellow lined up one side. Simple fix and would solve a lot of anguish snd frustration from motorists.	Reducing speed on all Peninsula unsealed roads would be a good idea as lots are steep and windy.	Matt
36722	Akaroa		All roads	I think the current speed limits are pretty good and should not be changed. Cars are getting safer all the time so changing the speed limits in banks peninsular and Akaroa seem pointless. The only place a 40km speed limit imposition on the Main Street probably makes sense, but it's not often you would do 50 kmh any way. Changing the speed limits seems a lot of money for not much gain		Andy

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36698	Akaroa		All township	40km/h makes sense. Roads are generally tight and require people to drive carefully to navigate past parked cars etc, especially during summer months.		Ray
36757	Akaroa,Birdlings Flat and Kaitorete Spit		State highway 75, Christchurch Akaroa road	No need to drop speed limit, slow drivers drive slow and hold every one up, roading contractors need to do better work, so their repairs dont blow out every month, chambers in corners should be the right angles.	Reducing the speed limits will only add to frustration, and that's proven over the Governers bay to Diamond harbour, Gebbies pass roads, to add to that CCC will need to reduce the rate payers Bill's as less maintenance on those roads will be required.	Jeroen
36896	Birdlings Flat and Kaitorete Spit		Poranui Beach Road	This toad is a straight flat road that has only one house on the stretch proposed to slow the speed limit. The road is wide enough for vehicles to pass safely at 100kmph. I believe this one should not be lowered.	I agree with the other changes.	Bonnie
38029	Cass Bay	Lyttelton	Governors bay road, Park Terrace	There is no need to reduce the speed limit on the main road from Cass Bay to Lyttelton, the 50km limit is fine...the problem is that people do not adhere to the existing limit, not the limit itself. Reducing it to 40 km will make no difference. The current limit just needs to be policed. Reducing it to 40 kms will actually cause increased safety risks as people will be trying to overtake those who keep to the reduced limit.	The corner at Corsair bay is the only part of the main road where better signage and a reduced speed limit may be appropriate ...would be good to have one of those flashing signs showing your speed just before the bend.	Karen
38020	Cass Bay	Lyttelton	Governors Bay Road	Lowering speed limits does nothing, its a waste of time so please don't spend our money on that. I'd rather see more policing down on Governors bay Road at nights especially Friday and Saturday nights and on public holidays when its riddled with "boy racers" speeding and making noise. I'd also like to see Cass Bay made a 'residence only' area after hours so Police have the option to 'remove' people hanging about at 3am making noise, vandalising the playground and generally being a nuisance.		Aaron
38019	Cass Bay	Lyttelton	Governors bay road	We don’t need to lower speed limits in cass bay and this general area, we need to see better policing at night (especially Friday and Saturday nights and public holiday nights to curb the “boy racers” that speed round the hills and hang about at 3am making noise in our neighbourhood.	I’d like to see a “residence only zone” at night down in cass bay - this allows police to use common sense and move trouble makers along at their discretion as they see fit. Again, lowering speed limits does nothing at all - a waste of time and money.	Aaron

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38113	Cass Bay	Lyttelton, Corsiar bay and Cass bay	Park Terrace	Hi I have lived on Park Terrace in Corsair Bay for about 15 years now Boy racers are a big problem here. I'm in favour of anything that will make the stretch of road between Lyttelton and Cass Bay safer . We have 2 young children and when out walking during the day to the beach or Lyttelton is always feeling unsafe. We often see people speeding around corners during the day and you see them over correcting around corners and I'm scared about what would happen if they loose it just on the corner as we are walking there as well. I can think of at least 7 times that cars have gone over the edge or smashed into the fences or poles between corsair and Magazine bay and its just a matter of time before someone slides off into people. My girls often stop and look at the cars as they are off the edge of the road and comment on how silly it is that they go so fast. If the speed limit is lower, hopefully the issue of people regularly speeding at 70-80km/h will be taken more seriously by the police,. The consequences of speeding in a 40km/h area may act as a bit of a deterrent. The area is popular for speeding during the day and the night . Our cars are often damaged by people rounding the corner at speed then ripping off our wing mirrors, scraping the sides of our vehicles an the most common throwing alcohol bottles through our rear windscreen. My wife had her car punchered with a metal warratah. For a bit of variation my car was left teetering on a pile of the neighbour's firewood with all its wheels stolen. Used to replace all these blown ones on a car doing burnouts down at the big tree in the corner of corsair bay. It is very difficult to get off street parking in such a steep area - the engineering and consents alone would cost us $35K before we even started to retain and build a driveway. Because of the lack of off-street parking, and because of the popularity of the local beaches, there will always be vehicles parked along the road. If a car door is open, then the road effectively narrows to one lane and vehicles can't go in both directions - somebody has to give way. Vehicles are often travelling too fast, not anticipating this hazard. It's a dangerous stretch of road with regular accidents and the ability to speed with minimal consequences encourages the same lawbreakers who trash our vehicles.	Please find attached photos of all the damage done to our cars by boy races and people going too fast and side swiping our cars over the years. Also attempts to steal and stealing the wheels. This doesn't include the one of my van that was actually stolen!!	vernon

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				There are many children in Cass, Corsair and Magazine Bays walking to the school bus stop or cycling to school and the high speeds people travel at during the day also pose a very real risk to them. Yes, it will be inconvenient for locals, but a 40km speed limit says “we mean business” and could be taken more seriously than the standard 50 which many ignore.		
38103	Cass Bay	Lyttelton, Magazine Bay, Corsair Bay, Cass Bay	Park Terrace, Corsair Bay	I have lived on Park Terrace in Corsair Bay for 15 years. Boy racers are a huge problem here. I’m in favour of anything that will make the stretch of road between Lyttelton and Cass Bay (and the entire boy racer circuit) safer and less appealing to hoons. If the speed limit is lower, hopefully the issue of people regularly speeding at 70-80km/h will be taken more seriously by the police, leading to more active policing in the area. The consequences of speeding in a 40km/h area will hopefully also be more severe, acting as a deterrent. I don't believe lowering the speed limit will be an effective solution in itself - it will only make a difference if it is actively enforced. I am desperate for speed cameras in the bays and regular policing. Our vehicles are regularly trashed by people rounding the corner at speed then ripping off our wing mirrors, scraping the sides of our vehicles, throwing bottles through our windows or even hooning along smashing vehicles with bats. Last year the back of my car was torn open with a metal warratah which was then chucked onto our path. A couple of months ago my husband’s work car was left teetering on a pile of the neighbour’s firewood with all its wheels stolen. A neighbour has had the battery removed from her car by boy racers on a pit stop ...twice. Last month someone (not a boy racer) hit my car so hard their vehicle flipped and blocked the road. It is very difficult to get off street parking in such a steep area - the engineering and consents alone would cost us $35K before we even started to retain and build a driveway. Because of the lack of off-street parking, and because of the popularity of the local	Could we investigate installing speed cameras?	Monica

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				beaches, there will always be vehicles parked along the road. If a car door is open, then the road effectively narrows to one lane and vehicles can't go in both directions - somebody has to give way. Vehicles are often travelling too fast, not anticipating this hazard. It's a dangerous stretch of road with regular accidents and the ability to speed with minimal consequences encourages the same lawbreakers who trash our vehicles. In addition, there are many children in Cass, Corsair and Magazine Bays walking to the school bus stop or cycling to school and the high speeds people travel at during the day also pose a very real risk to them. Yes, it will be inconvenient for locals, but a 40km speed limit says "we mean business" and could be taken more seriously than the standard 50 which many ignore. BUT, to make a difference it must be monitored and enforced. Cameras. Policing. At community meetings we have been told the cost of cameras is prohibitive (cameras go to areas with more data). I would be very happy to contribute to camera cost.		
38013	Cass Bay	Rapaki	Governors bay road	The speed restriction is irrellevant if it is not enforced. We get boy racers and motorbike speeding at all times throughout the night.		Eileen
38080	Cass Bay		Mariner's Cove, Kaikomako Place, Bayview Place, Cass Bay Place, Harbour View Terrace	I support the reduced speed limits on all streets in Cass Bay. They are short and residential, with children often around. I'd also prefer to whichever speed limits we end up with policed more effectively, since currently both residents and visitors ignore them anyway.		Colin
38056	Cass Bay		Governors Bay Rd	The idea of lowering current speed limits have no merit as long as the current speed limits are generally ignored. We suffer from large numbers of speeding as traffic roar past far exceeding the current limits. Typically, at night and in the early ours of the morning load cars scream through with loud exhausts and screeching tyres. At the weekend multiple groups of motorcyclists thunder through treating the road like a race track. There is really no point in your consideration of lowering speed limits until the police actively monitor and impose infringement notices on this stretch of road 24 hrs/7 days a week. It may suit the council to keep this antisocial behaviour away from the four avenues but the current lack of interest in our problem is not good enough.		Hamish
38028	Cass Bay			There is no reason to lower the speed limit around Cass bay, largely the people speeding are boy racers at 1am and motorbikes on the weekend. The issue will not be solved by an arbitrary adjustment of the speed limit, we need a police presence at the times when the offending is at its		Gregg

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				worst, ie, 1 to 3am and the weekends when motorbikes and weekend drivers are cruising the bays		
38009	Cass Bay		Governor's Bay Rd / Park Tce	As a resident of Cass Bay, I use this road very regularly. It is our primary access to Christchurch and the rest of the country. The road is perfectly adequate to handle traffic safely at 50Km/h, with the specific exclusion of busy hot summer beach days. During those times, there is so much traffic that it would be impossible to drive at 50Km/h anyway. There have been crashes on this road. The crashes I am aware of are either the result of ill-health (which from hearsay happened recently when a driver passed out while driving), or of 'boy racers' driving off the road while driving at excessive speeds late at night. Ill health and boy racers will continue to use the roads no matter what you do. So the risk of crashes will not change. However, if you were to change the speed, you would be doing so due to ideological perceptions rather than working with facts. In other words, there is no reason to reduce the speed limit on this road other than (1) to criminalise existing good drivers; (2) to raise revenue through fines, and/ or (3) to annoy and frustrate the local residents. Safety is NOT an issue for this road at 50Km/h. I strongly recommend that you do not reduce the speed limit on this road, and that you turn your attention to real issues that affect the ratepaying community.	While my comments relate specifically to the road I use multiple times per week, I am confident that in most of the Peninsula, the posted speed limits are safe, with the specific exception of slow corners. Where these exist, they are almost always well sign-posted, and drivers with common sense will slow down for them. I would therefore echo my comments regarding the roads in my immediate vicinity. That is, Ill health and boy racers will continue to use the roads no matter what you do. So the risk of crashes will not change. However, if you were to change the speed, you would be doing so due to ideological perceptions rather than working with facts. I therefore strongly recommend that you do not reduce the speed limits on the majority of roads across the Peninsula. There may be specific one-off local issues that do warrant a speed limit review. I further suggest that you turn your attention to real issues that affect the ratepaying community.	Roger
38005	Cass Bay			As a resident of Cass Bay, my husband and myself strongly object to the lowering of the speed limit. Reducing the speed will have no effect on safety as most traffic offences with speed happen overnight when no one polices the area. These infringements happen with the speed at 50km so the only difference will be commuters like us, held up or used as a revenue generator. We suggest more police are necessary to address the late night speeders and crime that is far more of a concern to residents		Emily
37663	Cass Bay		Bayview place/ harbour view tce	Just noticed over the recent public holiday n great summer weather the beach n traffic was packed n along our street I heard road rage.. parking was scarce n traffic tight going up n down the hill.. suggesting if a one way traffic around summer or busy times would work to reduce congestion n dangerous driving. And so yes in Summer especially a 40km zone is good for the roads. Also another point road works over	Speed reduction is good for the narrow winding roads around the Bays and we need to share the roads with cyclists too. Thank you for removing the 100km sign on Gov Rd just by Rāpaki.	Cathy

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				summer in the Bays n Port Hills is tricky when it's beach season the road to Corsair beach was terrible over the Waitangi weekend.		
37090	Cass Bay		Bayview Place, Governors Bay Road, Park Tce + all Cass Bay	Totally agree with proposed changes. Too many people speeding up and down Bayview to and from the beach.	After having lived in Cass Bay for over a year now and as a regular dog walker, it is obvious to me that although the speed limit from end Park Tce onwards on Gov Bay Rd is 50kph most people exceed that substantially, especially motorbikes, 4WDs and 'enthusiasts' cars. It is frankly terrifying to see cars nearly lose it at speed coming down GB Road towards the Bayview Pl turn whilst walking two dogs up a narrow footpath. Car is king in NZ it seems.	Tim
37058	Cass Bay		Bayview Place Cass Bay	Excellent idea to reduce to 40km/h. However, having lived on this road for over 30 years I can assure you people will still drive at speed down to the main beach, a problem that has increased with the popularity of Cass Bay. I am convinced the only way to rectify this problem is either road speed bumps or a permanent speed camera.	Please take action on speed bumps and/or camera before someone's child is seriously injured or killed.	Michael
36945	Cass Bay		Governors Bay Road	Reducing the speed limit will do nothing to improve safety on the roads around Cass Bay. The main factor endangering Cass Bay residents is boy racers speeding along these roads at all times of day, but predominantly at night and especially weekend nights. They ignore the 50km speed limit and will simply ignore the 40km speed limit. The only way to stop them from driving so dangerously and recklessly is to have an increased police presence on the roads.		Philip
36710	Cass Bay		Governor's Bay Road	Looking at the map the proposal is to lower speed on Park Tce to 40km, but leave 50km on Governors Bay Road through Cass Bay. I think that sends the wrong message to drivers that they can speed up again. The 40km zone should be extended to the end of Cass Bay.	Introducing speed limits makes no sense if they are not policed. Every weekend, all night we have to keep up with boyracers hooning around the bays at ridiculous speeds. Someone going 60 instead of 50 during the day is not the problem. It's the races that happen at night and boyracers and motorbikes doing 100km and more. They need to be stopped.	Frank
36681	Cass Bay		Govenors bay rd	The boy racers are out of control .. Make it a no Cruze zone		Richard
36812	Cass Bay		Park Terrace, Corsair Bay	Hi, we live in Corsair Bay and have been living there for 14 years. Our kids need us to walk them down to the bus stop in the morning as speeding traffic / dangerous driving makes it very unsafe for them to cross the road. We have also had a number of vehicle flip / come of the road / crash through barriers or drive over the banks. So it is like playing	Just lowering the speed limit is not going to solve the problem of dangerous driving unless it is enforced. Bad drivers aren't going to change their driving habits just because a new speed limit sign has been erected.	Nick

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				Russian roulette every time we leave our home. Basically the road is treated like a race track with significant amounts of motor cyclists and motor vehicles breaking the current speed limit along with crossing the centre line outside our home (39 Park Tce) every week. I have even had to attend some head on crashes near my home due to bad driving choices. So, we are all for lowering the speed limit. However, if the new limits are not Policed then the current bad driving behaviours are not going to change. We really need some speed cameras or police presence Thursday - Sunday to curb the dangerous driving that occurs every week.		
36779	Cass Bay		Park Terrace	Hi, I live in Corsair bay and the road is hazardous. My neighbours and I regularly lose wing mirrors and other car parts from people driving too fast on the narrow and windy road or from bogans that just want to smash cars up. Most weekend nights the boy racers come round and do squeeleys and doughnuts, drive very fast and dangerously. Lowering the speed limit is good but already the current speed limit is ignored and not enforced as there are no patrols. I would suggest cameras along the road. That way the boy racers have an incentive to slow down as they can be tracked by their number plates. It will also stop them smashing up cars which happens regularly. Please consider cameras for enforcing the speed limit. thanks		Kim
37798	Cass Bay		Diamond harbour, Purau, Akaroa, Lyttleton, Birdlings Flat	The claim that 'a slower road is a safer road' , if taken to its ultimate logic, means that to have safe roads (a goal that the council seem to regard as overwhelming all others), vehicles should be reduced to walking speed, presumably with a person carrying a flag in front of every vehicle! Slower roads mean more congested roads. If vehicles must go, say, 20% slower, then they take 20% longer to travel any distance of road. Thus, all traffic is taking 20% longer, and if vehicle numbers remain the same, there are therefore 20% more cars at any given time. That is, 20% more congestion. And congestion is a contributor to accidents. So...slowing vehicles may in one way make roads safer, but in others have the		Peter

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				opposite effect. (Maybe danger will increase as people feel tempted to use their phones while driving, explaining why they are taking so long and attributing it to "having to crawl along"?) And this is not even considering the effect slower speeds will have on driver tiredness, consuming precious leisure time, fuel consumption and road user frustration as everything takes longer. After all, roads aren't JUST about safety. They're also about efficiency of transport, ease of movement and convenience. These will be somewhat reduced if speeds go down. Perhaps in areas deemed 'dangerous' some speed restrictions stricter than those currently in place, could be applied. But a broad kneejerk slowing of all these roads just on principle has more negatives than positives.		
36750	Cass Bay,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		SH74	there is no need to adjust most traffic speed limits as most vehicles are not able to achieve the current limit.reducing the limit will however cause traffic jams and extreme frustration with the lack if passing areas and slow vehicle bays.	slower speed limits don't make roads safe. better surface condition and maintenance makes a road safer.	Lytton
38094	Charteris Bay		Marine Drive	I support the proposed reduction in speed. This section of Marine Drive is popular with pedestrians and cyclists, and people enjoying the beach area. Reducing the speed to be in line with the other sections of Marine Drive is sensible and will improve safety.	I would like to see the speed through Charteris Bay reduced even further. The area is popular with pedestrians and cyclists. Combined with the narrow and winding nature, a reduced speed would make the area safer and more suitable for the road environment.	Arthur
38086	Charteris Bay			This is the only required one of all the changes listed. This road is popular with walkers going along the sea front, as you have not provided a much needed foot path this needs to be a 50 before someone gets hit. While your changing signs please change the ludicrous 30 on Andersons Rd to a 40 or 50. 30 leads to having to ride the brakes to remain in the speed limit, this is very unsafe driving as it causes brake fade. We are already aware of an incident where a car was overtaken by two pedal cycles going down this hill.		Andrew
36903	Charteris Bay		Marine Drive	I support reducing the speed limit to 50km/hr on Marine Drive in Charteris Bay, but would like the section of road where the speed limit is reduced to be extended further, past Orton Bradley Park, the tennis club, and beach front, to the bottom of the hill (Charteris Bay Road). There are		Heather

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				houses all along one side of the road in this section, so for consistency, it would make sense for this section to have a 50km/hr limit, since it appears to be a residential area. And this would make it safer for locals walking to the park, beach, or tennis club along the side of the road where there is no foot path.		
36671	Charteris Bay		Gebbies Pass Road and the	Why is Charteris Bay, Governors Bay/Teddington Road and Gebbies Pass road not an option?	Perhaps whoever made those speed limits up would like to commute from the Harbour for 6 months and see if they enjoy the ridiculously low speed limit. What was once a 40min drive to town is now well over 60mins.	Kate
36682	Charteris Bay,Diamond Harbour		Governors Bay	On a trip to camp bay we followed the speed limit, however I was passed several times including driving into Governors Bay. I didn't see any police on the road that hot sunny Sat I would like to see more fines handed out. I think we need to slow the through traffic down so that the pedestrians in particular children are about to use the roads for cycling and walking. I think those commuting to Diamond Harbour need to slow down and respect the communities they are driving through.		Marise
37102	Charteris Bay,Diamond Harbour		Main road between teddington and charteris bay	When heading toward diamond harbour along the main road through Teddington, the speed limit currently changes from 80k to 60 k. The 60k section starts too early on the route. You should be allowed to travel 80k up the hill from teddington until you enter charteris bay. It is maddening to have to drop your speed on a straight stretch of uphill road where there are no pedestrians or houses. Normal driving requires you to accelerate as you approach a straight road up a hill so you can counteract the effect of the effort required to climb the hill. At the current change from 80 k to 60k just as you are approaching the hill, you feel you are crawling along. And for no good reason. Theres no logic to having it so slow at that point in the road.	I like having the 80k section of road on the teddington straight. The road is often used as a speed track and I used to be overtaken regularly as if I was holding up traffic when I did 100k, which was the previous speed limit.	Trudy
37033	Charteris Bay,Diamond Harbour		Lower Waipapa Avenue & Marine Drive	Charteris Bay Marine Drive: There are a number of houses with access from within this area (Ngaio Lane) and many take walks along the shore front, so a reduction from 60km to 50km would be appropriate and safe and a proposal that I support. Diamond Harbour Lower Waipapa Avenue: This area is a thoroughfare for commuters, some of whom may exceed the speed limit, eager not to miss the ferry. As this area also accesses a variety of other services, the community hall, the library, the rugby club, the medical centre, and a		Nathan

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				number of private residences, I support the lowering of the speed limit beyond the proposed 40km to 30km to provide a safer village centre.		
36825	Charteris Bay,Diamond Harbour		Waipapa Ave., Marine Drive	I'm totally against the proposed changes. The present reduction in speed around the general Harbour area has been a pointless, arrogant and tone deaf understanding of the way local people use the roads. If anything, the safety has been made worse by the frequent appearance of 'road trains', sometimes consisting of 20 or so cars stuck behind one obstinate driver who insists on driving perhaps 10Km/hr below the speed limit. With the reduction in the limits it has made passing these drivers impossible, and from personal experience this has made the journey on occasions far longer. These lines of traffic simply did not exist prior to the last changes, and I am sure this has also made the temptation to pass greater than when the limits were more sensible [and natural], if anything making the roads more dangerous. There is a significant time increase on getting in and out of the Harbour area, and any further reduction in speed limits smacks of the typical high handed ignorant attitude we have come to expect of the CCC with regard to residents on Banks Peninsula. We are all aware this submission won't make a jot of difference to anything: you will have already made the decisions, as you did last time, and we know you are just going about rubber stamping everything. Perhaps you should pay attention to making the roads safer by repairing them properly than making everyone suffer a longer journey time than is necessary. Finally, I do not know of a single person who has agreed with your past actions, and this new set just rubs salt into the wounds. There is little commend you.	I think the use of contractions in your description to make the proposal look 'friendly' and 'helpful' and less formal is to diminish how seriously most of us regard your idiotic and insensitive changes.	Tim
36785	Charteris Bay,Diamond Harbour		Marine Parade, Waipapa Ave down to Diamond Harbour wharf	I do not object to these limits as few would exceed the proposed speeds in these locations anyway. I do, however, object to the unnecessary cost and additional complexity of a change which can have negligible impact on existing behaviours. - The proposed relocation of the 50 km/h limit in Charteris Bay simply includes a series of tight corners that few would (or could) take any faster than 50 km/h anyway. 50 km/h would still be fast. - The main section of Waipapa Ave from Marine Dr down to the cafe and car parking does not suffer from excessive speeds anyway as people are already slowing down to stop or for the steep, narrow, shared path to		Richard

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				the wharf with very tight hairpin bends - for which 40 km/h is way too fast. Both of these limit revisions are an unnecessary expense and will not change behaviour due to the physical layout of both locations. The time taken to analyse and propose these changes already appears to be a cynical waste of ratepayer funds and no further expense should be incurred in their pursuit. If any money is to be spent, it should be on a 20 km/h sign on the narrow path down to the wharf that is shared with pedestrians.		
36666	Charteris Bay,Diamond Harbour		Marine Drive, Waipapa Ave	I do not support the 60km being reduced to 50 km on Marine Drive in Charteris Bay unless the CCC develop the Head to Head walkway in this area, then it would be appropriate to extend it to Andersons Road junction only. I do support the 40km reduction on Waipapa Ave on the section to the wharf from Marine Drive. That is what most people do now.	Marine Drive past On the Spot commercial development and as far as Charteris Bay yacht Club should also be 40km. Can't understand why this is not on the radar.	Pat
37105	Charteris Bay,Diamond Harbour		Waipapa Ave; Marine Drive - all roads around the peninsula	I think it is a good plan to reduce the speed limits in these areas, in fact on all the roads around the peninsula. From Charteris Bay through to Diamond Harbour there are very few footpaths and people out and about at all times of the day and night. However, as a resident of Diamond Harbour who travels to Christchurch daily for work I can say that very few drivers, including locals, observe the speed limits already imposed. Tailgating, aggressive driving and dangerous overtaking are a daily occurrence. Generally speaking we seem to be a community of over confident drivers in late model cars who think we know the road, and maybe do, but take no account of walkers, pets, the elderly or children on the road - or these things called mistakes - otherwise known as accidents - that we all make. Many workers coming into the area in the early morning travel way over the speed limits, often driving one-handed while holding a cell phone in the other. There is currently no observable enforcement of the existing speed limits and no apparent accountability. So while extending reduced speed limits to more roads seems like a sensible thing, it also feels a bit like an exercise in futility if the people travelling those routes are unwilling to observe them.		Belinda
36684	Charteris Bay,Diamond Harbour,Little River, Western Valley and Okuiti Valley,Akaroa		teddintong straight, gebbies pass	the current speed limits are not enforced. people are driving fast & aggressively in this area despite the speed limit. i suspect lowering the limit will have no measurable effect, unless of course this is backed-up with speed cameras & patrols to identify people driving too fast		sam

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36716	Charteris Bay,Diamond Harbour,Port Levy/Pigeon Bay Route, Pigeon Bay		Marine drive, Charteris bay. waipapa ave, Diamond Harbour. Port Levy Pulau road.	Marine Drive - agree with chance from 60 to 50 for the section of road from Orion Bradley to traffic cop bay to meet existing 50 km speed limit. Diamond Harbour Waipapa ave road down to jetty...As this is so narrow and carries significant pedestrian traffic and as it is effectively one lane, the speed should be reduced to 30km hour rather than the proposed 40km ph. Port Levy road. Agree. I drive this road regularly and the speed limit should be reduced to 60. I have had many near misses on this road where cars come across the mid white line due to excess speed and unfamiliarity with the road.	Please also consider speed humps at either end of Andersons Road Charteris Bay, as drivers are using this narrow loop road as a short-cut to get ahead of slower traffic. This practice will be come a greater risk if the proposed speed limit on Marine Drive is reduced to 50km. Thank you.	Sue
36933	Charteris Bay,Diamond Harbour,Purau/Port Levy route			Lowing the speed limit in my opinion is a waste of time. We have issues over here with boy racers and the majority of people already drive to the limit for what I've seen and heard from others. How about dealing with the infrastructure first. Remove all the potholes and slumps in the roads over here. There are so bad and so bad for wheel alignments and suspension. Stop placing a bandaid on things.		Felicia
36763	Charteris Bay,Diamond Harbour,Purau/Port Levy route		All in the Diamond Harbour/Purau/Port Levy area	What is the point in lowering the speed limits as specified in these areas? There are crashes on Dyers Pass and other areas where the boy racers race (who ignore the rules) and cyclists try to take over the road. As a long term resident, I know there are not regular deaths in these proposed areas. What is your agenda? A lot of this population are elderly and disabled. Sorry but we're not going to bike to town or struggle with public transport and now we're going to have to dither along at snails pace or risk a fine.	It goes without saying that this sham of a consultation will be totally ignored even if the majority of submissions are totally against these ridiculous changes.	Claire
36755	Charteris Bay,Diamond Harbour,Purau/Port Levy route		all	Please just stop lowering speed limits. As seen - most notably by the changes over the Port Hills - they make no difference whatsoever. I've only lived here in Diamond Harbour for 18 years, but I've yet to see a single accident where lowering of a speed limit would have made any difference. If you want to spend money on roads, then we applaud it. Even the poor quality updates through Governors Bay make a difference.	Please provide any evidence that this strategy is doing anything more than frustrating road users.	Steve
38023	Diamond Harbour	Charteris bay, diamond harbour	Marine drive, waipapa ave	Leave the speed restrictions as they currently are, do not reduce them.	There is no evidence that reducing speed limits reduces accidents.	Hilary
38032	Diamond Harbour		Koromiko crescent	This is a small winding residential road. 50km is too fast. There are cars parked and driveways on corners. Difficult to see when exiting drives or		Liz

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				going round corners where cars are parked. Numerous times have almost had collisions. The speed limit on all the small winding residential roads should be reduced to account for people who dont drive carefully. It might at least make them think.		
36739	Diamond Harbour		Wiapapa Avenue	The speed limit on wiapapa is fine at the moment and lowering will just hinder people running late to the ferry,Especially with the new timetable.		Max
36693	Diamond Harbour		Whero Avenue	Please drop speed limit to 40 or 20 to reflect the nature of road and children playing in the cul de sac. People are driving far too fast at 50km.		Jim
37477	Diamond Harbour		Marine drive	Currently on Marine drive near Ngaio lane there is road works repairs by Apes contracting/Fulton hogan. This is now at least the third time they have had a go at fixing this same section of road. Ignoring a sunken section of rd just a few meters on from the 3 patches they have started to repair. Could someone from the council actually get off there seat take a drive to Diamond Harbour and experience this poor repair job for themselves. When common sense was actually common this whole section of rd would have been repaired as one part not 3 patches. You proudly lower the speed limit instead of fixing the rd I'm not asking for improvement as that is never going to happen that is clearly obvious. But at an acceptable standard would be the minimum. 7/10 would be acceptable enough from this council..		Nicki
36708	Diamond Harbour		Waipapa Ave	I would support 30 kph rather than 40 kph on Lower Waipapa Ave. My reason is 40 is not much different to 50. People have become used to 30 in central Chch and it should be the same here. It is low enough for people to be safer especially children as walking on the road happens in the village area.		Joy
36744	Diamond Harbour		Waipapa Ave	I would like to see the limit reduced to 20km/hr on the section of the road between the cafe and the wharf. This part of the road is used by pedestrians, cyclists and cars, and is narrow with tight bends, and no footpath or verge for pedestrians to be separated from cars. While there is a separate path from the wharf to the cafe for pedestrians, that is not the quickest route, and therefore the majority of pedestrians use the road.	I am generally in support of all the proposed speed limit reductions around Banks Peninsula, given the gradients, bends, and narrowness that most of these roads have, as well as the awesome scenery that deserves to be viewed at a safe speed.	Mark
36796	Diamond Harbour		All of the peninsula roads	Stop being lazy and small headed in your thinking. Stop doing the least usable, no effort fixes to make your jobs look like they're worth the salary. And actually LISTEN to the majority, not the whingers.	We, Banks Peninsula, are not an old age care facility - we are a commuting resource that is getting heartily sick of being left out of any decision making that directly affects us. Make a difference!!	Mark
36743	Diamond Harbour		Waipapa Ave	I recommend the speeds limit for lower Waipapa Ave (from the triangle to the jetty) be 40km		Adrian

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36834	Diamond Harbour		11 Stoddard Tce	Would it be possible to put in place a speed bump barrier on Hunters Road some metres on the up hill slope prior to the school and kindergarten? I suggest this as traffic coming down Hunters Road from Bay View Road gather momentum and thus speed as they pass the school gates. I have witnessed cars travelling excessively fast whilst passing the school Given the nature of the semi rural Hunters and Bay View Road etc, children tend to be less vigilant than their city peers.		Joan
36765	Diamond Harbour,Purau/Port Levy route		Purau avenue and Purau Port Levy Road	I fully support the reduction in speed limits. I would also like CCC to consider reducing the speed limits on roads where the roads are close to popular beaches like Purau Avenue. It might help to stop boy racers but will definitely make thinks safer for children and families. Thank you		Fiona
37950	Little River, Western Valley and Okuiti Valley	Akaroa		I believe that the speed limits should not be reduced as as akaroa relies heavily on people coming from Christchurch on their bikes and not only will this affect small businesses in akaroa and little river but will also take away the fun from a lot of of peoples weekends		Ben
38139	Little River, Western Valley and Okuiti Valley	All areas, plus areas not listed above			All areas/roads –I support the proposed speed limits, which will make the roads safer for all users including cyclists, pedestrians, and horse riders Diamond Harbour – should the residential streets be reduced to 40 km/h also? Summit Road – both Lyttelton Harbour and Akaroa Harbour – please reduce the speed limit (to 80 or below) on all sections not already below 100 km/h. These roads are for recreation and access to properties/Bays, not state highways. Many cyclists, walkers/runners, and horse riders use these roads (and the other back roads), and feel threatened by the speed drivers go currently, which is not always suitable for the narrowness of the road or in consideration of other road users. Other back roads – for consistency, please	Fiona

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					capture as many roads as possible (hard to see on the interactive map)	
37107	Little River, Western Valley and Okuiti Valley		KInloch Road, Okuti Valley Road, Reynolds Valley Rd	I support the reduction in the speed on gravel roads across the Peninsula, such as Reynolds Valley Rd to 60km/h. However I wonder if the reduction of sealed roads in relatively flat areas to 60km/h makes sense. For example, Kinloch Rd (from SH75 to Okuti Valley Rd) and Okuti Valley Rd (at least as far as Reynolds Valley Rd) would perhaps be suitable for a higher speed limit, such as 70 or 80 km/h. There is surely a risk of poor compliance with the new limit if people do not believe that the speed limit is justified. The proposal feels like it is quite blanket across this area, rather than assessing the unique characteristics of each section of road.	I am intrigued to see that Okuti is spelt as Okuiti throughout the consultation document. Is this now accepted as the correct spelling? If it is I will start using it myself. However from a Google search I cannot find any other instance of the spelling than material related to this consultation. I note all spelling of the walking track in the valley managed by CCC is Okuti: https://ccc.govt.nz/parks-and-gardens/explore-parks/banks-peninsula-parks-reserves/okuti-track Could you please let me know if Okuiti is now the accepted spelling?	Edward
36752	Little River, Western Valley and Okuiti Valley			Please don't change the main road of SH 75 to 60kmph it takes me over an hour to drive to work anyway and I can't afford for it to take any longer. We would have to move off the peninsula. A lot of people would		Jessica
36977	Little River, Western Valley and Okuiti Valley		Okuti Valley Rd and others	The speed limit definitely needs to be lowered. People appear to be incapable of driving to the conditions. We used to love walking and riding our horses but it is now too dangerous due to the amount of traffic and inconsiderate drivers who think that their right is to go as fast as possible despite road conditions. These drivers are a mix of visitors and locals.		Andrew
36772	Little River, Western Valley and Okuiti Valley		SH75 and Western Valley Rd	So good to see the speeds reduced. I'll feel safer walking on our minor roads round Wairewa. And when my daughter cycles to friends' houses. I would like to see the speed reduced on SH75 around Wairewa Marae as there have been close calls outside there as people accelerate to 100 coming round the blind corner. I'd favour 70 am the way to Cooptown		Donald
36723	Little River, Western Valley and Okuiti Valley		Western Valley Road	Thank you, we will feel much safer when walking the road having the speed limit set at 60km/h.		Tracey
36711	Little River, Western Valley and Okuiti Valley		Okuti valley	Sounds great to me if it goes down to 60 a lot of tourist come up this road way to fast ,and a few locals too.		Tony quigley

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36688	Little River, Western Valley and Okuiti Valley		State highway 75 in township	Lower speed please		Karen
36685	Little River, Western Valley and Okuiti Valley		Okuti Valley Rd	Very happy with a reduction to 60kph.		Warrick
36678	Little River, Western Valley and Okuiti Valley		Montgomerys Rd	pleased there is a review on Montgomerys rd. Montgomerys rd is a gravel road which is windy and very narrow in parts (only one way traffic). Being a resident of Montgomerys rd i am constantly put into challenging positions with other cars/trucks. Although i fully support the lowering of the speed limit there is no way possible to travel at said speed remotely safely. We have primary and secondary school children who walk the road daily to the bus stop at the junction of Montomerys and Western Valley. Montgomerys rd does not provide a side walkway for our children to walk safely as it is. local residents are aware of children at certain times but there is alot of other traffic on our road. There is 2 B&B's and a local automotive business which creates traffic a unknown road. Please Please Please!!!! reconsider the 60km limit.		Sue
36677	Little River, Western Valley and Okuiti Valley		SH75	Great idea of lowering the limit, however between taitapu and little river, 60km is possibly a bit extreme. 80km would be better and still safe. From little river to akaroa, 60km would be great. Yes locals will grumble, but hopefully reduce non locals pulling over in silly places and locals taking silly chances in dangerous situations. Can wr also work on changing the little river township to 50km. 60km is still too fast! But now if you are lowering the whole road, it will be safer for everyone to lower LR speed to 50km		Kaitlyn
36672	Little River, Western Valley and Okuiti Valley		Montgomery Rd, Bachelors Rd, Western Valley to Port Levy Rd	Where unsealed, these roads are only safe at 30-40 kph - due to MANY close calls - and should be designated as such.	I live on Bachelors Road and travel these routes often. Day trippers do not drive safely on these narrow routes and can cause life threatening encounters at times, expecially trail motorcycles.	Bernard
36721	Little River, Western Valley and Okuiti Valley		Chch akaroa road.	Please let's keep it real.. 100Kph is slow/safe enough you can't force this on the majority when the minority ruin it for some. I understand the well-meaning by the proposal of these changes but you can't stop accidents so many factors are involved. But speed is the easy one to target, try better roads/repairs and less foreign drivers better training ect. And other distractions when driving.	To make the 100kph roads around the banks Peninsula 60kph is simply ridiculous!!! For example a lots of people live in Akaroa, Duvauchelle, Little River, to name but a few. all commute to Christchurch city on a daily basis. If this decision was passed hundreds and hundreds of people would be affected every day week in week out. You would make the	S

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					daily commute up to an hour to an hour and a half longer.. I really don't understand the thought process behind this trying to moth ball people its is not the right way to do this.. I for one would leave the banks Peninsula because it would make my daily commute too long.	
36897	Little River, Western Valley and Okuiti Valley		Western Valley Rd, Okuti Valley Rd	I think a speed reduction to 60 is excessive. I am not aware of accidents occurring on these roads and believe they are in good condition and am surprised they are considered in the same category as Breitmeyers Rd and Pa Rd. I do not support the reduction to 60km.	I would have thought reducing the speeds past the school could have been considered. I am concerned the impact on property prices if commuting is made slower and harder. It is also a bit of an insult to all the efforts of Little River residents who for years struggled to get the main Rd through the built up area of town reduced.	Clinton
36749	Little River, Western Valley and Okuiti Valley		Okuti Valley, Kinloch Rd, Bossu Rd, Western Valley Rd, Montgomery's Rd	Thank you - I live in Little River and agree that a 60km speed limit would make these roads safer. In many cases it would be difficult (and downright dangerous) to go faster than 60 anyway e.g. on Montgomery's Rd, Kinloch Rd, Reynolds Valley Rd. Thank you.	I would also support a lower speed limit between Little River and Cooptown. Many people see this stretch as a chance to overtake at high speed, despite limited visibility due to corners and the added danger of the Church Rd intersection.	Kathryn
36687	Little River, Western Valley and Okuiti Valley		Okuti Valley Rd	Very happy with the proposed changes.		Sarah
36735	Little River, Western Valley and Okuiti Valley			I fully support all the proposed speed limit changes. As someone who spends holidays in the okuti Valley, i very strongly support the change in speed limit here, as it is a narrow road often used by pedestrians	I would also support a speed reduction on the road between Tai Tapu and Little River	Sally
36792	Little River, Western Valley and Okuiti Valley,Akaroa		Church St , Rue Lavaud, Beach Road & Rue Jolie	As the Streets are quite narrow 50km is to fast, even down to 30km especially Church St the Motor Bikes on the weekend go crazy down it, or put in speed bump.	Little River needs to be reduced to 50km/40km as the Road can get very busy, some just don't slow down at all. Reduce speed limit at bottom of Hill by the Orchard instead of closer to Cooptown.	Kerry
36894	Little River, Western Valley and Okuiti Valley,Akaroa		SH 75	SH 75 Little River to Akaroa is regularly used by groups of motorcycles driving at speed. They are apparently racing (each other or the clock) and we have often seen them overtaking cars in a highly dangerous manner, and even doing one wheel wheelies to show off. They are often in the middle of the road taking bends , and it is intimidating and highly dangerous to other road users. It is clearly joy riding and not travel for any useful purpose as they drive in, stop for refreshments and drive out again.	The exhaust noise of the bikes must be illegal - it can be heard for a huge distance. It is VERY disturbing for locals, and surely not the image Akaroa and the Peninsula want to convey for visitors. There should be tighter speed limits, and regular police checks for the speed and legality	Susan

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					of the bikes. They should be confiscated on the spot if found to be exceeding the noise limits that the rest of us abide by.	
36753	Little River, Western Valley and Okuiti Valley,Akaroa			As a visitor to the area (I live in Nelson) I'd like to strongly support safer speed limits. I have previously found the traffic speeds on these road to be intimidating and stressful to drive.	A number of rural roads in the Tasman/Nelson/Marlborough area have had speed limits reduced. Despite some initial very vocal opposition when first proposed, the public feedback once implemented has been overwhelming positive.	Bevan
36760	Little River, Western Valley and Okuiti Valley,Akaroa,Birdlings Flat and Kaitorete Spit		Sh1/rural roads	Speed reduction is not going to prevent speeding or promote safety, I use a work vehicle which is gps speed tracked and so travel the speed limit, yet I'm still overtaken all the time, but I also overtake, cars that travel well below the speed limit. I've seen the frustration created by slower moving traffic on the road.	Creating more passing places, better signs to pull over if there's traffic behind ect will go a long way to reducing dangerous driving be it slow or fast	Lisa
36667	Little River, Western Valley and Okuiti Valley,Akaroa,Birdlings Flat and Kaitorete Spit		all roads proposed	I support the changes	I would like to submit that further changes be inplemented. I feel that a speed limit of a maximum of 70 kph should apply on SH 75 from Cooptown to Akaroa; it is a windy and rather narrow road, and requires slow speed and care. I appreciate this may be under the jurisdiction of NZTA	Lee
36951	Little River, Western Valley and Okuiti Valley,Birdlings Flat and Kaitorete Spit			I would like to see the speed limit lowered around Little River. I notice a real 'race track' mentality among some drivers once they come off the hill from Akaroa. This endangers both local community members and visitors stopping in the township.		Lou
36901	Little River, Western Valley and Okuiti Valley,Southern Bays		Magnet bay road, te oka bay road, bossu road, kinloch road etc	Ridiculous proposed changes from 100 to 60 in these areas. Turning people into law breakers for What reason, revenue raising? Putting up a sign does not make the road any more or less treacherous. Why then is the road toll as high as it has ever been?....inattentive, distracted drivers. You will still drive off a cliff at 60kmh on gravel if you aren't paying attention. This will cause more issues with slow vehicles such as trucks and campers no longer being able to be passed by for fear of breaking a 60kph limit when much of these roads can quite safely be travelled between 60 and 80. The only possible reason for this can be revenue raising as any of these historic changes have seen camera vans and police officers sitting there to take advantage of new changes	Fully support proposed changes in built up areas such as towns but these are low traffic roads	Sam
36799	Little River, Western Valley and Okuiti Valley,Southern			I agree with the proposed changes, especially to akaroa township and the southern bay roads.	Thanks for asking the community for feedback	Khuzwane

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	Bays,Akaroa,Birdlings Flat and Kaitorete Spit					
37971	Lyttelton	Cass Bay, Charteris Bay, Diamond Harbour, Purau/Port Levy Route, Port Levy/Pigeon Bay route/Pigeon Bay, Kukupa, Puaha Valley, Little River, Western Valley and Okuiti Valley, Southern Bays, Akaroa, Birdlings Flat and Kaitorete Spit	All	The stated reason for the change in speed limits for the listed roads is to "make the roads safer". However, no evidence as to the need for the noted roads is provided. Recent evidence of changes in speed limit in the area would suggest that the change in speed limit has limited to no effect on safety on Dyers Pass Road - in actuality more people have been killed on the road AFTER the reduction in speed limit. It appears that the change in the speed limit has more to do with reclassifying roads to meet meet national guidelines as opposed to actually making any material impact on the road environment. In other words, changing the label on the road will NOT make the road safer. There is considerable evidence that if a road feels unsafe, then people drive more slowly. The roads identified already provide the environment that limits the speed at which people drive on them. Another factor is that there is going to be a very limited ability to police the change in the speed limit. The resources of the police are hardly likely to be spent monitoring the speed on isolated roads. Again - this is very evident on Dyers Pass Road/Summit Road in the lack of policing. I have a fundamental issue with the Council using this 'reclassification' of the roads to abdicate from having to do any meaningful change to the actual road to change any real world safety issues. Changing the limit on the road may make the Council feel good - but it will not change anything about the usage of the road. Again - using Dyers Pass Road as an example - the Council has carried out a wait and see approach to actually making this road safer (yet to be proven). They changed the speed limit and then waited to assess the impact on the safety of the road. As noted above - changing the speed limit made no discernible difference to the accident rate. The Council has now commenced a "road improvement" programme, whether this is effective - time will tell. One has to ask, why is the Council doing this if there is no change to the roading environment and that there is no policing of any change. Efforts would be better directed to actually making a difference		John

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38036	Lyttelton	Overall	All proposals	I support the proposed speed limit changes. The 40km/h limit changes for the Lyttelton/Akaroa urban areas and other settlements are all very sensible, and the 60km/h rural sections much better reflect the road environments in these locations.	It seems to me that some sections of Lyttelton and Akaroa could be even further reduced to 30km/h easily enough, given the constrained street layouts. Examples would include Beach Rd Akaroa through the main town centre, and some of the narrow/winding terraces of Lyttelton. If they don't already, any proposed 60km/h rural sections should have any centrelines removed to help reduce observed speeds - if they still need delineation around some curves, use edgelines.	Glen
38090	Lyttelton		Park Terrace	As you have already made up your mind and are going to do it anyway I an probably wasting my time doing this. Reducing the speed on this road will just leave to driver frustration. It has failed miserably on Dyers Pass which you have turned into a nightmare to use. On the Christchurch side drivers won't cross the yellow lines to pass pedal cycles (which should be banned from using the road) and there is no where for them to pull over to let the frustrated people behind drive at the limit. We had hoped the the road was going to be widened, a shoulder added and perhaps a couple of slow vehicles bay but no, all we get is massive inconvenience for some barriers and a drain we don't need. Lowering speed limits is not road safety, it's lip service. They will not be enforced as there is no where for the police to park up or turn around. Making people ride the brakes to stay at the limit is actually very dangerous and this is what you are causing. The last lot of changes were ill thought out and on roads like Charteris Bay Road and Andersons Road they were actually dangerous. Try employing someone to look at you road safety issues who has an understanding of driver behaviour, vehicle mechanics and the logistics of enforcement before churning out these I'll considered ideas..	Stop wasting our money on things we don't want or need and repair and resurface our road which has a chance of reducing the crash rate.	Andrew

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37494	Lyttelton		Cressy Terrace	As a long term resident of Cressy Terrace, Lyttelton I consider the proposed 40km/h speed limit for Cressy Terrace, Lyttelton, is too fast and a slower speed limit of 30km/h would be safer and more appropriate for this very narrow, winding road which has a number of completely blind corners that shouldn't be negotiated at more than 30km/h. My wife and I have witnessed numerous near misses outside our home due to people driving too fast for the conditions and not taking into consideration that there are other vehicles on the road. Cressy Terrace is a popular walking and cycling area for people of all ages and abilities, some of whom aren't capable of moving quickly enough to avoid fast moving vehicles. I implore those charged with setting the appropriate speed limit for Cressy Terrace to take into consideration the knowledge and experience of residents like myself who have driven this dangerous road for many years and know from first hand experience that 40km/h is too fast. I make my submission as someone who has spent a large part of my adult life as both a professional driver and a classic car enthusiast who enjoys and respects everything involved in driving motor vehicles, therefore I consider myself well placed to judge the correct speed limit for Cressy Terrace to be 30km/h, due to the road conditions.		John
38091	Lyttelton		Lyttelton to Governor's Bay	i drive the Lyttelton/Governors Bay road 4 times a day. the problem isn't drivers driving at 50kph, it's drivers crossing the centre line and driver's driving at 80kph+. this seems like a pointless exercise and a waste of rate payers money when there are never any police in this area anymore to police your suggested speed limit		Caroline
38069	Lyttelton		Norwich Quay	Any chance you can get NZTA to reduce or at least police the speed on Norwich Quay? Trucks hurtle out of the tunnel make a right turn from Dublin sketchy.	You may want to check the speed down the gaol steps, 40 is a bit fast lol.	Jed
37979	Lyttelton			I consider the proposed speed limit is too high. The OECD's International Transport Forum Speed and Crash Risk report outlining the relationship between speed and crash occurrence/severity shows the fatality risk to pedestrians and cyclists growing exponentially above 30 km/h. Therefore why is 40 km/h proposed for the township area of Lyttelton, the probability grows to circa 30% at 40 km/h.		David

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37630	Lyttelton		Dublin Street	I agree that the speed limit around Lyttelton needs to decrease. On my road specifically, we notice people going 80kish down the road a lot and worry about our pets and neighbours' pets getting run over.	We need speed cameras or more police presence to actually enforce the new proposed speed limit otherwise it will be pointless (just as the 50km limit is now).	Lori
37609	Lyttelton		Lyttelton township from Park Terrace to Sumner Road	I support reduction in speed limits to this area where I live. There are many pedestrians and cyclists, narrow roads and unexpected hazards all around this area. Further to this I would also put forward a further restriction in London Street between Canterbury st and oxford st. This is an area of very high pedestrian use coupled with angle parking and numerous shops and bars. Mostly people travel slowly but some people insist on traveling at full speed. It's very dangerous. Traffic slowing road furniture as in sumner would be a great idea		Darren
37572	Lyttelton			I support lowering the speed limit on all the roads in the speed limit review - especially the narrow, upper roads in Lyttelton, which should be 30km/h (e.g. Reserve Tce, Cunninghlam Tce). Limits would need to be clearly signposted and a perhaps use of digital displays to remind drivers of their speed/slow down e.g. down hill on Sumner road approaching Reserve Tce, in Corsair bay, Rapaki etc. Enforcement will need to be stepped up as many people speed in the bay area/Lyttelton.	**Please do not publish my name or any details with my submission for privacy reasons. If you cannot do this, then do not use my submission.**	Helen
37559	Lyttelton		CressyTerrace, Park Terrace, Brittan Terrace	I support the proposal to reduce the speed limit on the selected streets in Lyttelton to 40km/hr. These streets have many older homes with no off street parking so are frequently lined with parked cars, effectively narrowing them to at best 1.5 lanes. All of these roads have blind corners, that make it impossible to anticipate parked vehicles and oncoming traffic. Drivers frequently cross the centre line when they cannot see oncoming traffic. As well, in Cressy Terrace there are no footpaths past the tennis courts at the Lyttelton end. Pedestrians including children and families with pushchairs are forced to navigate parked cars and walk out onto the road further and risk interactions with fast travelling vehicles. Bicycles share the same risks. Vehicles often cut blind corners. Driving at the current speed limit of 50km/hr is dangerous.	Regarding Cressy Terrace. Driving at 50kmh is dangerous because of The road surfaces and edges are in a poor state of repair, with potholes to dodge when driving and uneven broken surfaces posing a safety risk to pedestrians. Regarding safety rails on the exposed edges of steep often subsiding drop offs to properties on the downhill side of Cressy terrace. These at best, are ineffective and at worst, non existant. Lowering the speed limit will need to be	Adrienne

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				Cressy Terrace is often used by fast drivers as a 'short cut' to Lyttleton when traffic is slow on Park Terrace. This frequently occurs in the weekends when Corsair Bay is a popular destination. A lower speed limit would make our streets safer for all road users and pedestrians if drivers took heed of this.	enforced, but there is a decreased Police presence in Lyttelton these days and none at night when boy racers are active. I have recently been personally abused when indicating to a speeding driver to slow down to a safe speed when I was outside my property weeding the roadside. I reported this to the police at the time. No feedback. There have been at least 3 recent car accidents on Park Terrace between the 'White Gates and Corsair Bay How would the new speed limit be enforced when the current speed limit is not?	
37104	Lyttelton		Sumner road	I agree with the proposed speed limit Drop to 40 km 30 would be better on the section of road the affects me,which is the section between oxford street and Reserve terrace. By the time some vehicles get to where st David's street comes out onto sumner road speeds of. least 80km are being reached as this is on a bend it is really dangerous for road users pedestrians like me that have to walk across the road to get home.add into the mix petrol tankers which need to cross the centre line to get around the bend ... caused often by cars parked on yellow lines at the bend.	If you decided to go with the 40km limit I would like to suggest that it is truly enforced . A speed camera just past our place would net you enough funds to build a grate over the ditch I have to negotiate getting out of my car.	Heather
36895	Lyttelton		All streets in lyttelton	Lots of people speed around the narrow winding residential streets of lyttelton. At the same time lots of kids walk and cycle the streets. As an adult pedestrian I have nearly been taken out a few times. I fear for the kids who may be less reactive.	The streets of lyttelton are narrow and windy and steep. Reduce the speed please.	Alvin
37607	Lyttelton		Lyttelton area	I support the proposal to reduce the speed limit in Lyttelton township to 40 km/hr . Lyttelton has narrow winding streets often with parked cars causing further narrowing .School age children often walk around their local area and many residents and visitors walk around the town . I have observed some drivers using unsafe speeds and there is no need for excess speed in such a small residential town . Britten Tce, Park Terrace and Governers Bay road between Lyttelton and Corsair Bay is also		Catherine

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				narrow and recreational cyclists use this and are vulnerable , so I support a 40 k zone in this area also . London St between Oxford st and Canterbury st has angle parking , many shops and pedestrians and could be reduced to 30 km/ hr as some drivers drive dangerously fast through this area endangering other road users .		
36818	Lyttelton		Simeon Quay	Simeon Quay needs a speed camera as there are so many people driving well over 50 km I'd say around 80 km or more I've seen so many accidents as I live at [redacted] Simeon Quay .some times I can't even get across the road they are going that fast I see many people coming down the steps from the Bridle Path to cross over Simeon Quay it's frightening and now we have the steps down to the port and water front pathway it's only going to be more or a concern for people's safety. A speed camera at the parking bay on Simeon Quay would stop the majority of people speeding and decrease accidents and make it a safer place for locals and visitors.		Tania
36713	Lyttelton		Britain terrace	Definitely agree with the speed limit change but my concern is who the heck will police it?? We hardly ever have police in lyttelton- When I was living on brittan terrace it was actually scary the amount of cars doing well over 100km And over taking on bends and it's not just the "boy races" The intersection of voelas road and brittan terrace especially, no one stops at the stop signs I witnessed so many near misses and every night I worried that a car would come through my bedroom. There needs to be speed cameras in place to actually stop these people and there dangerous driving.		Rachel
36683	Lyttelton		Brittan terrace	I feel that the 50kmh speed limit is suitable for much of this road. However it needs policing, lowering the speed limit to 40kmh is not going to stop those all ready using this road as a race track. Lyttelton and surrounding roads are very poorly if at all policed. Perhaps instead of slowing the already law abiding drivers to a crawl and still having hoons racing through at what ever speed their vroom vroom can go, a push on targeting speeding along these roads would be more productive.	Fixed speed cameras, hand held radar more police on road Thursday Friday nights.	Mike

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				Restrictions to access down by the boat ramp and playing fields at night, as to remove the area they come to congregate may also remove the desire to race around the streets over here.		
36747	Lyttelton		Governor's bay road	This has to be a joke right .... you get so many woman driving there husbands 5.7L hanmer at 30k's round there in the 60k zones like no tommrow its holding up people who have jobs to get to and making alot kore of a dangerous situation when it causes confrontation cause they seem to always think there in the right even though they are illegally doing under the speed limit .... lowering the speed limit is just gonna create alot more traffic in such a small tight road along with I feel as if you guys have just taking one side with all the old locals who also drive 30k's in a 60 just cause they feel like it	Seriously look into traffic systems and traffic flow in other countries like Germany! They dont have speed limits so the good drivers and shit drivers stay away from each other. Anyway the statement "These roads can be challenging for even the most experienced drivers" is seriously a fucking joke ... whoever thought that is seriously a idiot and a shit driver go get some lessons on cornering and being able to follow a good line	Ryan
37519	Lyttelton,Cass Bay		Brittan Terrace, ans Simeon Quay	These are main throughter fares like Norwich Quay, have foot paths, are for the most part straight, 2 laned and therefore should remain and be policed to 50KM/hr. At present many vechicles are travelling faster than this without any issues on these 2 roads. Most other Lyttelton Roads like Cressy terrace are only one lane, some with no foot path it would be dangerous to travel more than 40km/hr and I have not seen anyone travelling faster than 30km/h so speed limit does not need to be changed.	More of an issue is Governors Bay road beyond Cass Bay to Governors Bay and the Summit road where the road is a lot more twisty, there is no curb, no shoulder or footpath forcing all walkers, runners, horses and bikes onto the road, making the 60Km/h speed limit unsafe. There are near misses on these roads regularly and someone will be killed. These are used by a large number of cyclists and runners regularly including the Canterbury tri club events. Most weeks there are cars in a ditch or over the bank so it would be more appropriate to lower the speed limit across the all twisty parts of the port hills to 50Km/h, or widen the road so the is space for cyclists and walkers etc. We hear regular complaints.	Eaon
37048	Lyttelton,Cass Bay		Park Terrace	1. By far the majority of people (residents in the area) travel this road at 50K or less perfectly well. Lowering this limit will only infuriate local drivers. The people speeding in this area causing the accidents and problems are a minority and as they don't adhere to a speed limit now, changing it will make no difference. 2. Makes no difference what a speed limit is, if it isn't policed! Save money on new signage etc and spend it having a police officer drive up	Please, please address the problem minority and stop inconveniencing the local majority. We want the accidents to stop as much as anyone but this wont make any difference to the the minority, just frustrate the majority and cause more tension between residents of the area, and the speeding element around the bays.	Michelle

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				and down that road every day/night for a month recording speeding car number plates. Then continue this periodically (more than now).		
36967	Lyttelton,Cass Bay		Park Terrace / Governors Bay Road	I live in Cass Bay, so my family and I are regularly driving, walking and biking on the roads around Lyttelton and Cass Bay. There are certainly sections of these roads, particularly the long straight road in Corsiar Bay which is super narrow, and leaves minimal distance between footpath users, and vehicles. I have seen on numerous occasions heavy trucks, boy racers, sunday motorcyclists, or just impatient drivers flying down this stretch of road. I 100% support the lowering of speeds in these areas, in most instances 40km is the right speed to navigate these winding roads. The reduction of speed needs to be policed in the early hours, and weekends, when most of the 'rogue' road users come out. The benefits will be positive for ALL road users, cyclists included.		Davidq
36932	Lyttelton,Cass Bay		Simeon Quay, Brittain Terrace, Park Terrace, Bayview Place, Mariners Cove	The current 50km/h speed limits for the connecting roads from Lyttelton to Rapaki are appropriate in consideration that this is a main road and relatively safe to travel at that speed on the more open and straighter parts of the roads. The corners and parked cars on the side of the roads slow traffic down and the reduction of 10km/h is unlikely to make any difference other than increasing commuting time. There is a boy racer issue on this series of roads and particularly on Governor's Bay Road (NZTA controlled) but reducing the speed limit is unlikely to reduce their speed as they are already breaking the law. The residential streets in Cass Bay like Bayview Place and Mariners Cove do not need a speed reduction as it clearly evident that a low speed is required because of the shape of the roads and the cars parked on either side of the streets.	Boy racers are a problem for Cass Bay residents but speed limit changes are unlikely to make a difference unless they are policed and this is not happening sufficiently enough to make a difference.	Scott
36780	Lyttelton,Cass Bay		Governors bay rd	Bollocks to lower speed limits, just get police out here from Thursday night till Sunday night. Speed cameras too! The boy racers love it here and are rampant with ZERO policing done		Pete

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				over the weekend evenings. Get the police out here, that's what we need. Speed, accidents and crime are out of control.		
36728	Lyttelton,Cass Bay		Governors Bay Rd, Park Terrace, Brittan Terrace, Simeon Quay	I have lived in Cass Bay for 42 years. It's unnecessary to reduce the speed limits on these roads. It's not going to stop the boy races that use these roads. More police presence speed cameras would be better. Also better parking control for beach goers who abandon their cars on verges and footpaths would certainly help with traffic flow. Also encourage cyclists to travel in single file not 2 and 3 abreast. This would very much reduce the accidents on this road.		Wendy
36724	Lyttelton,Cass Bay		Governors Bay Road and beyond	I strongly disagree with the speed changes, it's the residents that will be affected not any boy racers or mad motor bikes that feel necessary to treat our roads like open roads.	As a resident, I would be more than happy if the police or speed cameras were more prevalent in the bays! And from 9pm Thursday night until late Sunday nights would be when you will do your best work! Trust me, we listen to it every week!	Lisa
36844	Lyttelton,Cass Bay		Govenors bay road/ lyttelton township	I agree with the proposed changes to reduce the speed limit. As a resident of Cass Bay it can be hard to turn right onto Governor's Bay road as cars often exceed 60 so anything to slow them down would be appreciated		Isla
36978	Lyttelton,Cass Bay		Main Road - Governors Bay to Lyttelton	I travel this route 4 to 5 times a week, especially now with the big waits on Dyers Pass. The speed limit has got progressively lower over the years and while I appreciate it is done to supposedly keep people safe, I don't feel I drive too fast and I always drive defensively and carefully through built up areas. To drop to 40 km per hour is just crazy. Furthermore, there is only one straight to pass on and so if you're stuck behind the equivalent of a Sunday driver, you just have to hang in there and bow to their inexperience.....which happens a lot. The only reason I ever feel unsafe on this piece of road is because of the boy racers, who use this road as a speed way with corners. They're holding us to ransom on the road and if you think they'd abide by further speed restrictions, you're dreaming. I suggest you put your money and energy into eradicating these guys from the road and let the rest of us abide by the status quo.		Jane

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36881	Lyttelton,Cass Bay		Governors Bay Road but whole road from sumner road to Rapaki	Fully support reduction in speed but please police with speed cameras really sick of boy racers.		Ellen
37352	Lyttelton,Cass Bay		All Roads in the Cass Bay suburbs and Governors Bay Rd to Britten Terrace	I agree with lowering the speed limit on all roads within Cass Bay as it is an area with a lot of children and elderly people. who need a safe environment to travel in. The increased amount of traffic coming to our beach causes a lot of congestion with Harbourview Terrace and Bayview Place are particularly dangerous with reversing vehicles, poor visibility for pedestrians and vehicles and random parking habits. We also suffer from "Boy Racers" finding this a good location for wheelies. A curb build out at the end of the footpaths on the Bayview side, by the new toilet block and outside 39 Harbourview Terrace would help to prevent this happening. I do not think that lowering the speed limit to 40km/hr on Governor's Bay Road would work as it is a major through route for trucks, busses etc which would effect their travelling times and also that of local traffic. If people keep within the 50km/hr speed limit and stay on their side of the road, the current limit is appropriate.		Jenny
37026	Lyttelton,Cass Bay		Sumner Road and Lyttelton in general	I am in favour of the reduced speed limit. We frequently observe motorists having difficulty navigating Lyttelton's roads. Anything that gives them a chance to make better decisions would be welcome. Also, pedestrian access from upper Sumner Road over to the lower footpath in the vicinity of the St David's St steps is at times dangerous. Lower speed limits should help to alleviate this. Unfortunately just changing the limits without some (at first) gentle enforcement may well prove ineffective.		Simon
36890	Lyttelton,Cass Bay		Brittan terrace	Re speed limits I have lived in Lyttelton for 9 years now and overlook brittan terrace, To be honest most people drive sensibly are its a very rare occurrence to have an accident on these roads, however there are a certain group of young people who use this loop track as their personal race course generally after 9pm untill 3am It would be interesting to sort the accident stats by time of day rather then area	The naval Point car park is a meeting area for boy racers who do burn out there and use the gravel carpark as a gravel donuts area, its been going on for years and only just last month did the council put up gates to limit some areas, police ignore the issue, by sealing off these areas you attract less racers and you should have less accidents Camera should be installed at Governors bay and Naval Point, I suggest you look at the cost of this speed process and spend the money on	Dudley

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					speed deterrents NOT enforcement. All camera points are near power and internet so the costs will be minimal, I hope youlisten to my comments and reply, thank you	
36714	Lyttelton,Cass Bay		Governsbay rd	50km is a okay speed, the roads are the problem. Reducing them to 40 and then mixing the speeds is a idea to make more money rather than safety	Fix the raiding surfaces in Lyttelton, the subpar patch up jobs have to stop.	M
36702	Lyttelton,Cass Bay		London St, Brittan Tce, Park Tce, Governors Bay Rd	How about having police actually patrol the dangerous driving on Governors Bay Rd at night when the boy racers, car thieves and general hoons are causing issues rather than trying to ping locals for minor speed infractions?	Police should also be watching speed of truck drivers on Norwich that think they own the road and can ignore the speed limit already in place there	Paul
36686	Lyttelton,Cass Bay		Brittan Terrace	I live at the beginning of Brittan Terrace [redacted] and many drivers (particularly boy racers) are hitting 70km plus going past my home. Extremely dangerous when there are so many families living between this road and Cass bay. Speed bumps would further slow down these vehicles		Lynaire
36697	Lyttelton,Cass Bay,Charteris Bay		Governors Bay Rd, Park Terrace, Brittan Terrace	I travel on these roads several times a day.. both commuting to work and at other times. THERE IS ABSOLUTELY NO NEED to reduce the speed limit. The only consequence of this will be frustrated drivers, increased commute times and local people being financially impacted through speeding fines. DO NOT MAKE CHANGES THAT ARE NOT REQUIRED, WELCOMED and serve no useful purpose.	Please show me/ the community the data supporting this statement “Accident figures show that there are significant benefits from reducing speed limits from 50km/h to 40km/h in townships in relation to these roads". You can not make such a blanket statement to justify what you are proposing without referring to the specific roads supported by evidence. And has this been tested ? I KNOW these roads and they NOT roads that are prone to a high rate of accidents other than those caused by boy racers at night time. It is the BOY RACER problem the council should focus on, rather than ignoring it and coming with a hair brain idea of reducing the road limit to 40Kph.	Philip
36906	Lyttelton,Cass Bay,Charteris Bay			Don't drop the speed limit. Enforce the current laws		Daniel

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36863	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour		Dyers pass road, marine drive	I think you should concider resurfacing the road out here instead of continually reducing the speed limit. The road is so bad its wrecking my car		Meghan
36740	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour			Speed limits are to low now and reducing them futher will only make people take more risks as alot of driver's don't do the speed limit and hold up others. Also bikes on these roads making it impossible to pass is another problem. I feel these speed changes are more focused to people not able to drive on hill roads and of course bikes.		Carol & Murray
36776	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route			Reduced speeds are an excellent idea. Most of the proposed roads are narrow, winding and completely unsuitable for 100km/hr limits. I often bike the roads around Lyttelton Harbour and am frequently passed by vehicles going too fast and too close. Hopefully reduced speed limits will encourage everyone to slow down, have patience and enjoy the views.		Ian
36798	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		All	I have grown up on Banks Pensuila, and deeply oppose speed limit reduction, especially to 40k in areas as it is a speed people cannot judge making them wait when they should go, and the go when they should wait out of frustration. Put the money it costs to do all this into training New Zealand drivers to be better, or just make is all ride bloody horses at 10kph everywhere again.		Tomás
37452	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			Please don't change the speed limits, it's already frustrating enough sitting behind slow drivers through these areas.		Jordan
36741	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon		All current	The speed limits need to stay the same, as is. I moved to this country 40+ years ago from Brisbane, and was amazed that the corner speed signposting across all NZ was absolutely spot-on - legal speed-wise - for a safe, comfortable passage. It was clear to me then that New Zealand had "got it right", even though city limits are usually 50kph and 60kph		Morgan

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	Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			over the ditch. It just needs to be policed better the way limits are already set here. Police also need to be authorised to use discretion on whether a driver/rider poses a threat to themselves or other road users if straying over the limit. (Perhaps they already are?) Thanks for considering my opinion. Yours faithfully, Morgan		
36718	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			I am happy with the proposal - the whole of Lyttelton should remain at 50km/h.	I am happy to discuss on a call if requested to	Keith
37072	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		All the above	Please don't do this. The speed limits are already sufficiently slow provided you keep to them. If you can't police the area sufficiently, then the speed limits don't make any difference.	There is no point spending tax payer money on re-signing etc. Decreasing the speed limit over Dyers pass road has had no effect on safety or prevention. Unless you SIGNIFICANTLY increase the policing, and, specifically the police presence in the areas specified, there is no point. The people that speed, were speeding when it was 80kph limit, and 100kph limit and nothing has changed. Still the same accidents, same injuries. I drive these roads daily, and I am more concerned over cyclists inability to share the road, speeding down hill, holding substantial lines of traffic up going up hill and complete lack of knowledge of road rules.	Neil

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36733	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			No I am not in favour of lowering the speed limit, please listen to your constituents instead of looking at a computer screen.		Andrew
36770	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			We do not need speed limits lowered. Cars and other vehicles that use the roads ie motorcycles are all increasingly more capable and competent. If anything we should be putting money towards driving competency n training rather than pandering to the lowest common denominator.	In my opinion, lowering of speed limits is a cop out by government at both local and national levels as it's easy n cheap to change road signs but harder and more expensive to provide better training to drivers. This will be hugely disappointing for a majority of drivers and riders that use these roads. Please please don't.	Shane
36806	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western		All roads	Leave the speed limits, they currently work. travel will take to long around these areas. Changing them will not save lives, this has been disproven so many times. Thank you.		Hamish

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	Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit					
37453	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		All of them	I use these roads every weekend in the motorbike we bring money to the local shops cafes and bars in Akaora, without the cruise ships us bikers are the bloodline for these small local cafes.		Tom
36835	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		all	I strongly support reducing speed limits within and around the villages and towns on the BP. I dont support the reduction of 100kph to 60kph limits, however it wouldnt be the end of the world if it happened. It would mean that I would regulalrly brake the speed limit on my bicycle though.		mark
36786	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		All of them	Myself and 20 other friends ride these roads every week for pleasure we being hundreads of dollars a week to our local bully Hayes in Akaora which is struggling without the cruise ships income due to covid 19 we ride at 100km which is a fair speed putting it to any less than that courses huge congestion and we will stop riding the road if this happens thus our bike page of 500 people will also. Which means thousands of Dollars a month lost to local communities in akaroa and the likes		Tom

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36769	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		All roads on Banks Peninsula.	I am against any changes to the current speed limits.	Lowering the speed limits will discourage people visiting and living in Little River, Akaroa and the rest of Bank Peninsula. Instead the focus should be on improving the conditions of the road in particular the road surface and road widening. Driver education will also help with road safety.	Edson
37450	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		all roads on banks peninsula	reducing speed limits is unnecessary. many accidents are caused by the current substandard road conditions on banks peninsula. the seal is very patchy, and also has many raised areas/bumps and corrugations making it hazardous for motorists, especially for motorcycles/cyclists. definitely consider widening the roads and improve the road surface instead.	I feel reducing the speed limit will dishearten the current residents of Akaroa/banks peninsula as it will increase their commute times, discouraging residents/visitors to live there and/or visit	kelly
36762	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western			Lowering these speeds is a wasted gesture at best. As a result of lower speed limits, expect to see more frustrated drivers and more distracted drivers. People who have always ridden/driven these roads in a spirited fashion will continue to do so (they'll ignore your new speed limits)		Ligma

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Submission ID	Which area are you commenting on	If commenting on more than one area, please list them below	Road name/s	Comments	Any further comments	Name
	Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit					
36725	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		Christchurch Akaroa Riad	Lowering speed limits will not improve overall safety. It will only reduce the severity of crashes. Or may not help at all due to the video that a lower speed limit allowed drivers to drive with less attention as the outcome of an accident is less severe. This is human nature, think if the speed limit was incread to 150kph people would use there phones less as the outcome is more severe. I do not like the lowering of speed limits as this increases travel time as well as driver in attention. It is the responsibility of the vehicle operator to drive to the conditions as well as ensure the vehicle is in good operating order. If this is the case the current speed limits would not be a problem, especially with more modern safer vehicles.	Can you please start looking at things practically. Many decisions lately have been conter intuitive. Have a look at the empty T2 lane on the Northern coridore. 28 million spent on this is absolutly incompetent . FYI this motorway was designed to be safe as 110kph (NZTA) so why is it 100kph, some incompetent people I will not mention wanted it to be 80kph ? Motorcycling has Ride forever to keep riders sharp and more attentive to reduce road crashes, perhaps this would be something that should be pushed out to all driver's. In attention is the issue, so solve in attention. Lowering speed limited is putting a band aid on the arterial blead. Try driving around these roads before making any decisions regarding reduced speed limits.	Nick
37467	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		Most roads	Completely disagree with this, think it’s over the top		Paymon

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36963	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			I'm very in support of the proposed reduction in speed limits for the above areas in Banks Peninsula.		Melanie
36766	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			I fully support any proposals made to lower speed limits in urban and residential areas, as well as in areas of narrow, winding and steep country roads (as per the proposals). This reduces the chance and severity of collisions. It makes the experience of other road users and pedestrians (especially small children) safer and more pleasant, and it reduces carbon emissions.	People who vociferously oppose these proposals have probably never had a friend or relative killed or injured by a speeding motorist, have never been close to a traffic cop traumatised by attending mutilations caused by speeding drivers, or lack the imagination to put themselves in those situations. Or perhaps they are themselves speeding motorists who get their kicks out of endangering everybody else's lives, who nevertheless wish to shift the blame onto a perceived culture of "revenue gathering" by local enforcement authorities. Or perhaps they are just those who genuinely don't understand that by driving a little bit slower, the consequences of a mistake at the wheel become so much less. And, no doubt, they believe it will "never happen to them", until it does... And to those who think that handing out tickets does nothing: how many lives have been saved in the interval in which recently chastised drivers drive slower after receiving a ticket? Depending on how fat their wallet is, this period can last anything from 5 minutes to 5 months or more. And though the calculation would be impossible to make with any statistical rigour, no mathematician would say that lives have not been saved during these	Jonathan

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					times of pecuniary curtailment. If only the fines could be means tested so that wealthy drivers couldn't afford to speed up again so quickly!	
36737	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			Lowering speed limits does not make people more attentive or more competent drivers. While having a crash at a lower speed does mean less damage/ harm the crash is never caused by speed, it is always the driver fault unless mechanical failure occurs. The current areas of lowered speed limits to 60kph around Banks Pennisula are mainly being ignored along with the 30kph areas in Central City Christchurch, why doesn't the council spend the money on fixing the road surface, instead of pointless changing of speed limits. The problem is not the speed limit it is driver competence. Drivers need to be responsible for their actions not babied by the Council, unfortunately this is not how the legislation is written. The overwhelming majority of people have been and do still drive and navigate all the above roads without incident at the current speed limits, why should the minority of incompetent drivers dictate speed limits. Where are the statics for the number of vehicles using a road and the number of accidents. How many 1,000's or 10,000's more trips are made for every 1 accident.	As a resident of Lyttelton, I already find the recently lowered speed limits around Banks Pennsiula to increase driver frustration and potentially lead to worse more dangerous driver decision making when compared to having the previous higher speed limit. I personally have not heard any praise for the lowering of the speed limits to date. I am a regular user of many of these roads both as a driver and a cyclist, the lowering of the speed limits does not make much difference as a cyclist, driver courtesy makes significantly more difference to how safe you feel. If a car hits a cyclist at 40kph or 60kph they are still likely to be killed or seriously injured.	Calum
36694	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			I agree completely to lower the speed limits in the above selected areas. Also to know that these areas will be patrolled regularly by police. Especially in the evening when boyracers are out and about.		Lisa

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36751	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		All	These are ridiculous proposals. 40km/hr is a totally unworkable speed limit, particularly around so much of Lyttelton and Akaroa. The speeds in those locations are determined by the traffic and pedestrian numbers already. To ALWAYS be tied to 40 is ridiculous. 60 Km/hr for areas where the existing speed limits work well (and I travel these roads very frequently) is again so punishing for everyday travel. where I have experienced these changes (eg Hundalees) they have slowed down the everyday traffic to a crawl and the real problem issues still remain. This is a text book solution that in practice is unfair on the good guys. Classic example of lowering the bar to the lowest common denominator. Critical issues are drivers crossing the centre line and others driving way too slow leading to impatient responses. This is where the policing and the work needs to be directed.	Please do not do this!!!!	Kevin
37451	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		All	Changing the speed limits in these areas will not make these roads safer. Drivers are likely to become more irritable and take more risks. Only changes in speed I support is slower where there are intersections then back up to open road speeds. Changing the speed of the whole section will not achieve safer roads. Motorcyclists and car enthusiasts use these roads for recreational rides/drives that help keep businesses alive, especially during these times. Restaurant and cafes in Akaroa and little river would suffer if one of their largest groups of patrons decided to do their rides elsewhere. Please reconsider the speed limits suggested. As I mentioned earlier, I support safer speeds at intersections, but open road should stay the same.		Natasha

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36703	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		All	I find it amazing that you took so long to change the speed limit in Little River through much public pushing only to drop the limit down 10 kmph when any time in the summer or weekends there is wall to wall cars either side and would only take a child to quickly step out and be hit and now you want to limit the open road speed to 60kmph where 100 kmph is very safe to do so... you either have rocks in your head or nothing to do in your office or have a need to gather more revenue!!! Dont tell me it's for safety because the state of the roads is a big problem, the CCC was collecting funds from the cruise ships but little went into infrastructure of the damaged roads from contentious buses and traffic associated with the ships and the amount of logging trucks in the area driving on a 'B' class road, I would say that the council have skimped on the allocating of tenders to companies like GSL where I struggle to find one good completed job. If you want less accidents there should be more passing lanes and more pull over signs for slow drivers so people can get about their day safety without making rash bad judgments calls in passing pathetically slow drivers that are on holiday rubber necking at the beautiful scenery and not looking in their rear vision mirror to see 20 vehicles behind them. Please show some commonsense and make plans to accommodate all drivers because some of us live here all the time.	I would also like to mention the road I live on ,Pettigrews Rd, the previous mailman used to comment on how it was the worst road (condition) on his RD3 mail run, I would comment that he only has to go do it , we have to go up it which is way worse, over the years more people have taken to the back roads to explore but the amount of grading and maintenance of water tables has not increased, where sides of roads have slipped away the cheap option of putting up barriers has come about as I presume the council budget for these outer roads is not important but you would not pay for my yearly mounting mechanical bills due to the shoddy state of the shingle roads around the Peninsula, this is what makes the roads unsafe as the conditions such as many bone jarring potholes and unremoved grit now determine the speed.	Guy
36781	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern			Around the residential area, specifically around housing, a 60km limit is understandable. However, that kind of speed limit would nearly double the amount of time it would take to get to and from Akaroa, killing any local tourism as the drive is far too long. This would then mean anyone living in Akaroa would likely have to commute to the city but again this is not economic financially or time wise and would isolate the community more. Leave it as it is or create specific speed limit changes solely around tight corners. A 60km open road does more harm than good.		Annabelle

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	Bays,Akaroa,Birdlings Flat and Kaitorete Spit					
36777	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		Christchurch Akaroa Road	I do not agree with the proposed speed changes as they will delay commuters and tourists thus affecting the economy of Akaroa as less people will want to visit with that extended travel time. However, more passing lanes would surely solve congestion.		Hannes
36860	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		All Roads	I don't want ANY speed limits reduced anywhere in New Zealand. I've beern riding motorcycles and driving cars and trucks on them for 45 years without ANY problems or accidents !!! The problem we have is with all the incompetant drivers that are on our roads. Why should the majority have to be penalised for the minority??????????	Low speed limits just cause frustration which leads to poor over taking manouvers etc. Govt etc have been dropping alcohol limits and speed limits continuously for years and what is the outcome????? No change to our road toll, just the police get to fill the coffers a lot more.....	Martin
36801	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			Reducing speed limits does not prevent accidents. Driver education and better roads does. Strongly against this!		Grant

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36852	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			This proposal is an excellent one. Speed limits should be set based on the local road conditions, not just cookie cutter 50km urban-100km rural.		Connor
36773	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		Govenors Bay Rd, Main Rd, Govenors Bay teddington Rd, Charteris bay Rd, Marine Dr, Purau Ave, Gabbies Pass Rd, State highway 75/Christchurch Akaroa Rd.	The speed limits are fine. Lowering them will not stop crashing. Fix the god damn roads before you do anything else. Lowering the speed limit will just cause more issues. You do not need to bloody do this. FIX the roads.	Stop making stupid ass choices that have nothing todo with people crashing. Its how people drive that kill people. Not the speed.	Liam
37457	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western			Drive Nelson to Blenheim and see what a difference reduced speeds make to the driving experience. It is dramatic. There is no longer justification to drive fast. The environment suffers, stress levels rise and it becomes an unpleasant experience. Roads, in terms of signs and speeds need to be suitable for all drivers but consideration should be given to first time users.	I have spoken to Andrew Hensley about signage on the Akaroa Highway. I was impressed with his approach to his job and his decision making process. Having had a daughter die on the Akaroa Highway, I am an advocate of reduced speed limits (though speed was not a factor in her death). But she	Sarah

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	Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit				was a recent resident of Little River and I do believe strongly that there needs to be an emphasis on signs and speed limits for new users of the road. These speed reductions, make it safer for cyclists, walkers and other road users. Locals will not be seriously disadvantaged as the increase in travel times will be minimal. I fully support reduced speeds on Banks Peninsula	
37413	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			Generally support lowering speed limits in all these areas.		Bruce
36889	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			Strongly support lowering speed limits to reduce risk to road users, especially cyclists and runners along the road		Scott
36795	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern		All roads associated with speed reduction.	I strongly believe that reducing the speed limit by such a significant amount is going to cause more damage than good. From personal experience and general knowledge we all know that 60km/h is just plainly too slow for those roads, leaving the limit at 100km/h allows people to just drive without having to freak out about exceeding speed limits. People will forever continue to do 100km/h along thag road even with restrictions because they know that road. They actually have a home at the end of that road and they don't want to spend their entire lives just driving home. I believe that this reduction will cause chaos with		Henry

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	Bays,Akaroa,Birdlings Flat and Kaitorete Spit			road rage and extremely dangerous overtaking manoeuvres. It's exactly the same thing that's happening with dyers pass road. People get frustrated as the speed limit is set significantly too low and drive recklessly to overtake the (old person usually). People know how to drive and leaving the road at 100 gives people the opportunity to actually get anywhere! The world around is is speeding up and governments throughout the world are focusing one being able to move people from a-b as quickly as possible with growing populations on a global scale. Why is it that back here in NZ we are slowing down? We've been capable of driving these roads at high speeds for decades. Leave the speed. Don't just create a revenue gathering exercise for the police and leave the bloody road alone!		
36782	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		Banks Peninsula altogether	I agree with the proposed plan to lower the speed limit in the Banks Peninsula. This will lower the risk of a crash and its consequences.		Pascale
36764	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			All posted speed limit reductions are essential to improve the safety of these roads. Reducing speed directly reduces the number of deaths and serious injuries. I agree with all proposals for reductions in speed limits		Nick
36950	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha		All roads	If lower speeds are safer, why not make every limit 5kph? Your logic is horrendous. Newer cars and better roads are safer than ever but all you do is keep down this path of, everyone walk everywhere. Stop it you horrible people.		Andrew

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	Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit					
36784	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			Isn't amazing we have more safer vehicles on our roads than what we have ever had yet we are being told that we need to lower the speed on open roads. Agree in the main streets of Akaroa 40km would be okay and going over the hill from cooptown to Barry's Bay should be70 to 80km I do a fair bit of driving and the one thing that I see that doesn't get enough attention from the powers that be is the keep left rules and people not pulling over to let traffic flow. I couldn't give a dam if someone on the open roads want go along at 30km but so long as they don't almost hug the Center line and kept right over to the left and allow traffic to flow without lines of traffic trying to get by them sometimes in the wrong spots. If this sort of driving was policed harder I am convinced overall traffic would flow a lot safer with less accidents no need to lower the speed on the open roads also if the money we pay in road taxes was all spent on improving the roads where needed would be a big help but somehow I can't help thinking there is a hidden adjective to get more of us on push bikes but that's another story. PS my input is more around Akaroa to Christchurch		Trevor
36797	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			Speed change is on going to make it worse for everyone eg people out for a drive or coming and going form work		Ethan

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36787	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			The speed limit should not be lowered. Lowering the speed limit will not do anything, as those who disregard will not follow it and those that arent competent enough already go below it. Lowering the speed limit makes it a pain in the ass for competent law abiding road users		Henri
37705	Lyttelton,Cass Bay,Charteris Bay,Diamond Harbour,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit			The speed limits that have already been introduced across swathes of the banks peninsula, from Lyttelton all the way through to Gebbies Pass in the past 3 years, were a tedious and unnecessary exercise. I object to further incursions unless a convincing case for their need is made. I do not hear of casualties and deaths so frequently on these roads that the virtues of further restrictions are immediately obvious. Your actions and intended actions are constraining our ability to live, work and enjoy the area freely.		Alex
37706	Lyttelton,Cass Bay,Charteris Bay,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		Alex Romain	The speed limits that have already been introduced across swathes of the banks peninsula, from Lyttelton all the way through to Gebbies Pass in the past 3 years, were a tedious and unnecessary exercise. I object to further incursions unless a convincing case for their need is made. I do not hear of casualties and deaths so frequently on these roads that the virtues of further restrictions are immediately obvious. Your actions and intended actions are constraining our ability to live, work and enjoy the area freely.		Alex
36712	Lyttelton,Cass Bay,Diamond Harbour,Little River, Western Valley and Okuiti Valley,Akaroa,Birdlings Flat and Kaitorete Spit		Main highway	I am in favour of a 50kmh speed limit in areas with houses and pedestrians. I am not in favour of a reduction in other areas		Stephen
37704	Lyttelton,Cass Bay,Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Puaha Valley,Little River, Western Valley and Okuiti			The speed limits that have already been introduced across swathes of the banks peninsula, from Lyttelton all the way through to Gebbies Pass in the last 3 years, were a completely tedious and unnecessary exercise. I object to any further incursions unless you can make a convincing case for their need. I do not hear of casualties and deaths so frequently on these roads that the virtues of lower speed limits are immediately		Alex

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	Valley,Akaroa,Birdlings Flat and Kaitorete Spit			obvious. Your actions and intended actions are constraining our ability to live, work and enjoy the area freely.		
36732	Lyttelton,Diamond Harbour,Akaroa,Birdlings Flat and Kaitorete Spit			I support the changes in these areas, as well as the changes more generally.		Cody
36768	Lyttelton,Diamond Harbour,Little River, Western Valley and Okuiti Valley,Akaroa,Birdlings Flat and Kaitorete Spit		Christchurch akaroa road			Ben
36876	Lyttelton,Diamond Harbour,Port Levy/Pigeon Bay Route, Pigeon Bay,Akaroa,Birdlings Flat and Kaitorete Spit			For those that live on BP and drive these roads every day the outlined speed restrictions will be even more a hinderance in terms of the connection to Christchurch and the like. I would argue that in many situations of driving these roads in the last 20years incidents or near incidents are in many cases caused by campervans and or tourist drivers where speed was not a factor but rather wreckless driving.	Please do not change this speed limit	Johann
37810	Port Levy/Pigeon Bay Route, Pigeon Bay		Akaroa and peninsula roads	This is a nonsense. There is no problem with the limits except they are not enforced. The problem is dangerous and incompetent drivers who should not be using our roads. Put lots of enforcement there and rigourously prosecute dangerous, inconsiderate and bad driving. Problem solved!! Better road design would solve lots of problems. In Akaroa put up signs by the fire station of how the roads work. In north Akaroa make rue lauvard and rue Jolie one way.	I would like to speak to the group considering this proposal	Kevin
37012	Port Levy/Pigeon Bay Route, Pigeon Bay		Wharf Road and Port Levy Road	I am in support of the proposed submissions to reduce the speed limits on these roads.		Rachael
36917	Port Levy/Pigeon Bay Route, Pigeon Bay		Pigeon Bay Rd	Agree with the reduction in speed limit to 60km on this road.	The only issue I see is that there is no way it can be policed so unsure how effective it will be, but is a good start.	Michael
36956	Port Levy/Pigeon Bay Route, Pigeon Bay		Wharf road Pigeon Bay	I agree with 40km on wharf road but from the camp to the wharf should be reduced to 10km as there are no footpaths and adults & children tend to walk from the camp to the boat ramp area. There is increased traffic in this area, large 4WD's towing boats, & a very narrow windy road.		Heather
36842	Port Levy/Pigeon Bay Route, Pigeon Bay		Port Levy - Pigeon Bay Road	This is a very narrow, metal road, not suitable for caravans or nervous drivers. In many places passing is impossible without backing and finding a wider spot. Placing a 60 km/h is both pointless and unenforceable. People are compelled to drive to the conditions. The		Ray

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				remote farmland through which the road goes is very different from roads near houses or camping grounds, where children, dogs and walkers might be found. Taking an "It can't hurt" policy ignores the likelihood of providing a perverse incentive, whereby people think, "I'm not going to be told how fast to drive out here" and drive faster than they would have. Unless there is firm evidence that speed reductions have a significant effect in such situations (and I'm not talking about the middle of Copenhagen), they should not be implemented.		
36962	Port Levy/Pigeon Bay Route, Pigeon Bay		Pigeon Bay wharf road , .between the junction of Pigeon Bay Road and the wharf.	This is a very popular walking route, in fact it there are more pedestrians on this road than cars. There are no foot paths on this road and there are 2 blind corners, there are also two exits from the camp ground where there has been a serious accident.	There is also a boat launching ramp where boats and trailers must back across the road to launch. This is a particularly dangerous area where there are also a lot of children playing in and around boat houses, I have seen vehicles come through this area at 50km/hr (which is the speed limit) I recommend a limit of 30-40km hour from the bridge and 5km from the camp ground to the wharf.... Pigeon Bay Road (existing 50 km/h speed limit section) 50 km/h reduce to either 30 or 40 km/hr	kevin
36935	Port Levy/Pigeon Bay Route, Pigeon Bay		Wharf Rd, Pigeon Bay and the Port Levy/Pigeon Bay route	I have a property in Pigeon Bay and agree with the proposed changes for the Pigeon Bay area. For Wharf Rd that is proposed to change to 40km/h, this is a good change as there are often children and people walking and biking on this road, particularly near the camp ground. There is no need to drive faster than 40 km/h on this road. Likewise for the Port Levy/Pigeon Bay route - the road is not safe to drive at faster than 60 km/h, so I agree with this change. An additional benefit of lowering the limit is that it would reduce the wear and tear on the gravel road if people are travelling at lower speeds.		Zach
36879	Port Levy/Pigeon Bay Route, Pigeon Bay		Pigeon Bay road, Wharf road	We agree to a reduction in speed to 40km for wharf road and 60kms for Pigeon Bay road	There is increasingly more traffic on our rural roads and therefore we should try and keep our roads safer by reducing the speed for all concerned	lynette
36833	Port Levy/Pigeon Bay Route, Pigeon Bay		Pettigrews Road, Middle Road, Pigeon Bay	We agree with the 40kms per hour for both shingle roads, Pettigrews Road and Middle Road, which are two roads we have property on. Over many years have had to deal with the outcome of vehicles and motor bikes coming to grief with higher speeds than this. Main sealed roads on the Peninsula can only be safely travelled at 50 kms with maximum of		David and Sandra

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				60kms. We agree with all the proposed changes to the limits over the whole Peninsula area.		
36767	Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		Harmans Track	I agree totally with speed reduction. Most of our rural roads have steep gravel, tight corners, and steep gradients that can not be driven safely at 100km. Many areas including ours does not have footpaths (which we do not expect) and its common to walk, push a pram, ride a horse on a small verge or the road. Ive had many close calls with drivers on Harmans track traveling probably 100km.		Gilda
36746	Port Levy/Pigeon Bay Route, Pigeon Bay,Little River, Western Valley and Okuiti Valley		Port Levy/Pigeon Bay Road and Western Valley Road	Shingle roads, very narrow with many blind corners so should have a speed limit of 40km/hr rather than 60km/hr.		Elizabeth
36811	Port Levy/Pigeon Bay Route, Pigeon Bay,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa			What a waste of time and money. You cant go fast on these roads anyway. In Akaroa most people go slowly, some don't look where they are going but will be even less likely to look at the slower speeds. Without the cruise boat people present hardly anyone now regards the road as a walking area. I would like the figures published of accidents caused by cars driving at the present limits on all these roads. Not of those going over these limits, that would be good info but separated out		Anne
37981	Puaha Valley		Puaha Road/Harmans Track	Support the 60km/hr limit for Puaha Road and the sealed portion of Harmans Track. The 4WD part of Harmans Track should be treated separately especially the steep section as one approaches Hill Top. This section should be 40km/hr as it contains steep blind corners. If it was sign posted as a 40km/hr from the Hill Top end (SHW 75) it would discourage drivers using it as an alternative faster route other than sticking with SHW 75. At present to safely drive the two steep bends in the road (near the Hill Top end) one must be driving at a very slow speed and be prepared to stop if there is oncoming traffic. Any oncoming vehicle travelling at 60km/hr would most likely not be able to avoid a collision.	Strongly support the overall plan for the reduction of speed limits on Banks Peninsula	Matthew
36706	Puaha Valley		Harmans Track	We welcome a speed reduction on Harmans Track. However, I believe the speed reduction should be lower. This road is used by local pedestrians and horse riders with very little roadside verge in places for them to escape to when traffic is passing . Also, sections of the road are only one lane and it is not safe to travel faster than 40km on the stock track. Travelling faster than this on the stock track would prevent you from safely stopping (especially travelling down hill) if you encounter	I believe the gravel section of the track should be reduced to 40km/h, and the rest of Harmans track should be 50km/h.	Katrina

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				someone coming the other way on one of the many blind corners, or if you come accross stock on the track, which I have frequently encountered.		
36734	Puaha Valley		Harmans Track, Puaha Valley, Little River	I would like to support the proposed changes to lower the speed limit on rural roads (like Harmans Track for instance) to 60km per hour. As well as the same township speed limit for Little River as proposed for Akaroa.	My whole hearted thanks to CCC and NZTA for proposing those changes!	Jutta
36699	Puaha Valley,Little River, Western Valley and Okuiti Valley		Okuti Valley Rd	At last. There is some appalling driving in this road which makes it very dangerous for walking animals cycling. There at Even people overtaking. Thank goodness you are going to lower the speed limit at last for all of these rural roads		Joanna
36675	Purau/Port Levy route		Purau-Port Levy Road	I support the change from 100km to 60km. Currently we also have an issue that people are doing well over 50 in our 50km zone in the residential area by the beach and as the road straightens up along Purau-Port Levy Road before the 100km mark. There is a tendancy for people to speed up once the road is straight. Signage to notify drivers of stock movement, school bus route and walking on the roads would be good. There are no pathways along Purau-Port Levy Road.		Jill
37618	Purau/Port Levy route		Camp Bay Rd	Speed sign needs to be at beginning of Camp Bay not passed the beach. People are parked up along the beach with there children right where people pass at speeds. Judder bars would also be a good idea. We live at beginning of Camp Bay and it is shocking the speeds people do!!!		Dianne
36857	Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays		Bossu Rd, Port Levy Pigeon Bay Rd, Pigeon Bay Rd, Middle Rd, Holmes Bay Rd, Duvauchelle Stock Route, Pipers Valley Rd, Summit Rd, Jubilee Rd, Reynolds Valley Rd, Western Valley Rd, Kinloch Rd, Lavericks Ridge Rd, Camerons Track, Big Hill Rd, Charlton Rd	The above listed unsealed gravel roads are extremely popular with Adventure Motorcycle enthusiasts. Although 100km speed on most parts of these routes is not suitable (much like a 75kmh speed recommendation arrow on an open highway) reducing the speed limit to 60kmh or less is extremely restrictive and unnecessary, unless there is just cause for a particular road or section of road, eg multiple incident or accident history.	As an off road motorcycle riding enthusiast, I am not advocating for high speed motorcycle riding and am aware of the often dangerous riding some “road motorcycle” riders demonstrate on the Chch to Akaroa highway which I believe is irresponsible and dangerous. I respect the posted speed limits of current roads and do not deem it necessary to reduce speed limits on roads unless there is a problem with an individual road (or section thereof) where there is a proven and documented history of danger, near miss incidents or accidents that can prove speed was a factor in the incident and an investigation(s) deems speed limit reduction is necessary and justified.	Steve

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					I do not approve or endorse a blanket 'all or multiple' road speed limit reduction without individual investigation and/or cause.	
37113	Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Kukupa,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Birdlings Flat and Kaitorete Spit			I support the proposed speed reduction for Banks Peninsula's rural roads. Before reading this proposal, it hadn't fully registered with me that the speed limit was 100kph for some of these roads. It's just not possible to safely drive them at this speed. A lower speed limit will support safer cycling and walking for the other users of the roads. The roads of Banks Peninsula are a valuable cycling asset and I'm keen for cyclists to feel safe on them. Many of these roads don't have a lot of traffic, so it can come as a surprise to both the cyclist and the motorist when they encounter each other - a lower speed limit would make this safer. I don't have a view on the proposals for the urban roads.		Maureen
36756	Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		Christchurch Akaroa Highway	I feel strongly about keeping the road speed limit to 100. If you change it it will mean People have to start even earlier for work who commute to Christchurch. It also does not warrant rate payers money wasting on it.		Catherine
36717	Purau/Port Levy route,Port Levy/Pigeon Bay Route, Pigeon Bay,Puaha Valley,Little River, Western Valley and Okuiti Valley,Southern Bays,Akaroa,Birdlings Flat and Kaitorete Spit		All I travel them for work	I believe the speed limits should remain the same and there is no reason to drop them you should consult with locals and not make discussions from Christchurch once again. These roads have low traffic volume and you should first measure the traffic volume before putting this to the public.	It would be nice if these forms are listened to as other issues on the peninsula have been commented on and the word of the people ignored and minds made up behind closed doors.	Sam
38058	Southern Bays	Maybe Akaroa	Main Road Wainui	The speed limit should be reduced past the foreshore and beach at Wainui as there are picnic tables on both sides of the road and kids play on either side. It is not safe at its current speed limit and should be reduced significantly.		David

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37599	Southern Bays		Wainui Main Road	A reduced speed zone (30 or 40 km/hr) and/or active speed management is desperately needed on Wainui Main Road adjacent to the swimming beach, ski lane, and boat ramp (approx No 728 to 836 Wainui main Road). There is a high level of pedestrian activity, children playing and accessing the beach, picnicing adjacent to road, car parking, boat trailer manoevouring and parking etc along this section of road, especially over summer and at weekends. This high risk area urgently needs attention - perhaps more so than some of the other rural roads proposed for speed restrictions. I note that there is a 40 km/hr restriction on Wainui Valley Road near the YMCA facility but no restriction along the waterfront where there is a greater volume of traffic and considerabley more pedestrian activity. I am informed that this matter has previously been drawn to Council's attention so it is particularly disappointing to find that it has not been included in the current proposal for speed limit changes on the Peninsula.		Paul
37611	Southern Bays		Wainui Main Rd	I would like to see the speed limit along the main beach front reduced to 30km an hour. During summer it can get very busy, there are cars parked all along the grass verge and so therefore there is very little room for pedestrians to walk safely along the road. The limited visibility for a driver means there would be no time to react if a child was to run out onto the road. Therefore a slower speed limit would be make sense before an accident occurs.		Emma
36691	Southern Bays		Wainui Main Rd and Cemetery Rd	Wainui Main Rd along the foreshore - the speed limit needs to be reduced to 40km/hr. It is a very busy area with houses close to the main road and the slipway where many, many boats come in and out of the water and park up. It is difficult to see young children and animals when all the boats are there so having a lower speed enforcement will help make the area safer. Remember Wainui does not have any medical facilities and takes over 30mins for a car to come over from Akaroa to render any medical assistance. Cemetery Rd (top part of) speed needs to be decreased as really it is a one way road but currently is 2 way and cars speed far too fast on this road and as the bushes have not been cut back, visibility is very difficult especially when there are many bends on this road. An accident is bound to happen soon with more people coming into the bay.	You have not put Wainui on your list.	Carol
36924	Southern Bays,Birdlings Flat and Kaitorete Spit		Te Oka Bay Road, Magnet Bay Road, Kaitorete Spit, Tai Tapu-Little River	Te Oka Bay Rd/Magnet Bay/Southern Bays - I fully endorse dropping the speed limit on these roads. You can't possibly drive 100kph on them and should not try.	Have you considered reducing the speed on the main road between Tai Tapu and Little River? I find this a very dangerous road to drive on because of the driving behaviour of other	Jacqui

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				Kaitorete Spit - I don't think these roads need to be reduced in the sections that are sealed. They are dead straight with good visibility. It makes sense to drop the speed on the unsealed section, as people are often unaccustomed to driving on gravel roads and forget that they can loose control quickly or spray stones onto oncoming vehicles.	motorists. There is a lot of traffic, including cyclists, motorbikes, towing vehicles and many tourists who are not familiar with the road and their vehicles. Every time I drive that way I witness ridiculously dangerous overtaking by both cars and motorbikes. I would support dropping the speed limit on much of that road to 80kph.	
37141			In particular Pigeon Bay catchment roads / Holmes Bay Rd Port Levy/ Purau catchment roads	As the Past Chair of the Akaroa Wairewa Community Board and Banks Peninsula Community Board I am very familiar with a considerable number of roads across Banks Peninsula including all the Bays in both the Harbours and outer bays and southern bays . The speeds being suggested on many of the roads back to 60kms on many of the shingle roads is still is too high for the designs and present road conditions eg 60kms on the Holmes Bay / Port Levy Rd a shingle one lane road with few passing areas , tourists locals just look at the speed limit and drive. Our modern cars today as you drive past a road sign show the speed to drive and this encourages much faster speeds rather than driving to the conditions. The driver will treat these signs as a challenge		Pam
36816			All over the peninsula	Rural postie Spends six days a week on the road If the speed limits do go in, they need to be policed or speed cameras need to be installed. Pulling out of driveways with overgrown hedges, and poor visibility is always a huge problem. Especially if there are cyclists coming down at speed.		Lillie

Akaroa Ratepayers and Residents Association Inc

To: Christchurch City Council
PO Box 73016
Christchurch 8154

Date: 25 February 2021

Attn: Sam Sharland, Engagement Advisor

SUBMISSION REGARDING SPEED LIMITS

The Akaroa Ratepayers and Residents Association is an Incorporated Society that has been established to promote the interest and wellbeing of the community in the Akaroa area. This submission is made on behalf of the members of this organisation, and we believe this also represents the general interests of the wider community.

This submission has been prepared by Harry Stronach, the President of the Society.

We wish to be heard in support of this submission.

Basic Principles of Road Safety
We are all interested in having safe roads. However we are also interested in having a realistic and practical system for achieving that objective.

The key objective is that drivers should be both taught and encouraged to drive to the conditions. Instituting a system with an excessive number of speed limit changes does not encourage driving to the conditions – it simply leads to the idea that the stated limits are more important than common sense. This can become both confusing and distracting, and in practice that can detract from road safety. So despite good intentions, there may be no net improvement in safety.

In particular, the idea that lower speed limits will make the roads safer is illogical on roads where the natural conditions are such that everybody currently drives below the existing standard speed limit. Community progress is not achieved by making rules to fix an illusionary problem, even if it does allow people to drive home from work mistakenly thinking "problem solved".

Visual Pollution and Clutter
The Council effort a few years ago in adding new speed zones around Akaroa has been widely condemned as a meaningless exercise, achieving no real safety objective while adding to visual clutter, and with the ratepayers shouldering the cost burden.

Excessive speed limit changes result in yet more signs, which simply become a form of visual pollution. Much of the Peninsula values, and earns value from, the slightly wild and untamed nature of the landscape. Degrading that landscape with unnecessary and repetitive signs is a significant intrusion and problem, and one where the Council is actively destroying value.

Consultation Process
It is unlikely that CCC will receive many submissions in regard to this "Have Your Say" episode. That is because the consultation processes that CCC run are widely regarded as a

sham, and so why would ratepayers and residents waste their time on engaging in a pointless exercise?

It is indisputable that Council have advertised and promoted this current process as a fait accompli – the advertising has said “We are lowering the speed limits….” without any proper acknowledgment that this is just a proposal that is being put to ratepayers and citizens as part of a consultation process.

This builds on a long history of Council disregard for the legal requirement to genuinely consult with affected communities. The word consult does not mean “we will ask people and then ignore what they say” – it means “we will listen to what they say and incorporate those ideas in the decision making”. There is very little evidence that the Council Staff have any understanding of the difference between those two statements.

In summary, this current process that masquerades as consultation is arrogant, rude, and insulting to the community. It is also illegal, in terms of the requirements imposed on Councils by the Local Government Act.

Cost Implications
The Council is challenged to produce a cost-benefit analysis to show that there is merit in the current proposal. This is to include:

- A review of traffic incidents over the last 10 years where excessive speed was a significant factor
- An analysis of what difference altered speed limits would have made to those events
- The cost of installing new signage for the propose new limits
- The costs of the sham consultation process currently being undertaken
- The costs of maintaining a traffic engineering department that wastes time on such schemes
- The costs of establishing and enforcing a meaningful compliance regime for the proposed new limits
- The negative costs associated with the visual pollution of extra traffic signs

Dumbing down and over-regulating
There is a widely held view that Councils have an agenda to produce an ever-increasing blanket of regulations, both to justify their own existence and to suffocate the population into acquiescence. After all, it may be dangerous to encourage a population of confident and capable citizens who may end up thinking for themselves. What future for Councils then?

This current proposal fits neatly into that concept. Is it part of the long term, even if unconscious, attempt by Councils to train and mould the citizens to accept this progressive dumbing down? It is up to the Christchurch City Council to prove otherwise.

Submission by

Harry Stronach

(President, Akaroa Ratepayers and Residents Association Inc)

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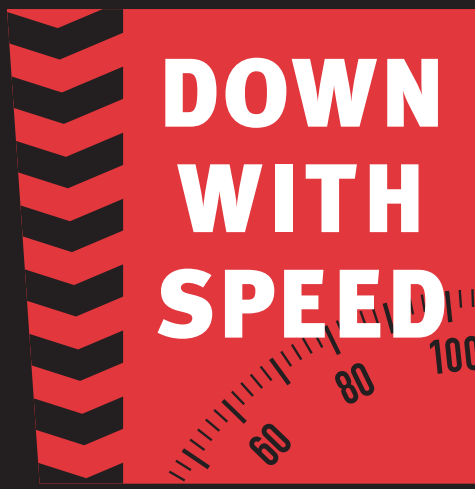


Down with Speed: A Review of the Literature, and the Impact of Speed on New Zealanders.

We can't afford to ignore speeding on our roads

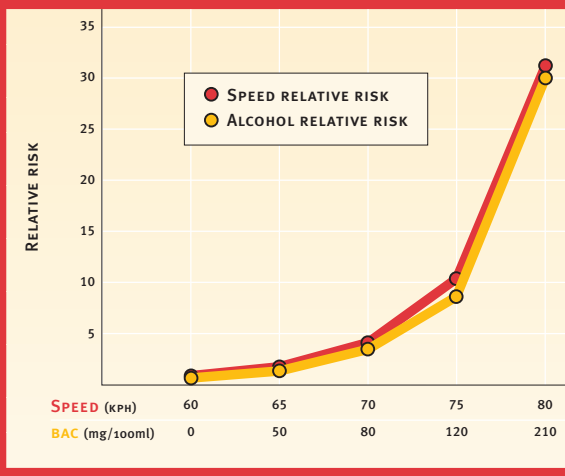
Excess and inappropriate speed on our roads is the single biggest road safety issue in New Zealand today. And yet the seriousness of speeding is still lost on many people. Hundreds of New Zealanders are killed or injured each year, but many people openly admit to enjoying driving fast on the open road; a view which sadly seems to reflect a widespread tolerance of speeding as an acceptable social behaviour. ACC is concerned about the deadly attitude to speeding that New Zealanders are taking to our roads. With research assistance from the Land Transport Safety Authority, ACC wants to dispel some myths, and provide new information about speeding which New Zealanders simply can't afford to ignore.

1 Higher speeds result in more crashes

The faster a driver travels on a road, the more likely the driver is to crash. A driver travelling on a road at 90 kph, for example, is more likely to be involved in a crash resulting in an injury than if the driver were travelling at 80 kph. As speed increases, the stopping distance increases, there is greater probability of exceeding the critical speed on a curve, and there is greater chance other road users will misjudge how fast the speeding driver is travelling.

2 Higher speeds result in more severe injuries

The severity of injuries resulting from a crash is directly related to the pre-crash speed of the vehicle, whether or not speeding was a factor in the crash. When a vehicle crashes, it undergoes a rapid change of speed. But the occupants keep moving at the vehicle's previous speed until stopped, either having been thrown from the vehicle and hitting an external object, having smashed into the vehicle interior, or having been restrained by a safety belt or airbag. The faster the speed at which the human body must absorb the energy released in the crash, the greater the severity of the resulting injury.



Relative risks of involvement in a casualty crash for speed and alcohol

3 Speeding is just as dangerous as drink-driving

New research from Australia shows there is a comparable relative risk for drink-driving crashes and for speeding crashes. A 5-kph increase in speed above 60 kph in a 60-kph zone increases the risk of a crash resulting in a casualty by about the same amount as an increase in blood alcohol concentration (BAC) of 50 mg/100 ml.

There are large differences between penalties for speeding and drink-driving, despite the similarity in a driver's risk of crashing, and injuring or killing themselves or someone else.

	Base Offence	Relative Risk for Offence	Penalty
Drink-driving	Exceeding 80 mg/100 ml blood alcohol concentration	3.2	▸ maximum 3 months prison or $4,500 fine (maximum 6 months prison or $6,000 fine for third or subsequent offence) and ▸ 6 months licence disqualification (12 months for third or subsequent offence), except in special circumstances
Speeding	Travelling 70 kph in a 60-kph zone (speed limit exceeded by not more than 10 kph)	4.2	▸ fine of $30 and ▸ 10 demerit points (unless a speed camera offence) ▸ 100 demerit points in 2 years results in 3 month licence suspension

Comparison of penalties for similar drink-driving and speeding offences in New Zealand, for a similar relative risk of involvement in a casualty crash

4 Fewer New Zealanders would be killed and injured if we all slowed down

The speed we drive on our roads is a major public safety and health issue in New Zealand. 162 deaths, 539 reported serious injuries, and 1,896 reported minor injuries on the road were attributed to speeding in 1998. This is likely to be an underestimate of the impact of speed-related crashes and injuries.

If we reduced average speed on New Zealand's rural roads by just 4 kph – that is, from 102 to 98 kph – it is estimated that 52 fatalities, 133 serious injuries, and 257 minor injuries would be saved.

5 New Zealand's rural roads aren't generally built for speeds over 100 kph

A significant part of New Zealand's rural road network was constructed under an 80-kph open-road speed-limit regime. Where roads have been rebuilt, these design speeds have generally been increased to 100 kph. Similar road networks in other developed countries often have speed limits of 80 or 90 kph.

The roading system in New Zealand is not built to safely sustain vehicle speeds over 100 kph. We are consistently driving too fast on our rural roads.

National Winter Rural Speed Survey, 1999

Rural speed, average	102.1kph
Rural speed, 85th percentile	113kph
Percentage of vehicles exceeding 100kph	55.6%

Note: The 85th percentile speed indicates that 15% of vehicles travelled above this speed.

6 Vehicle design can affect how fast we drive

Modern vehicle design has created less noise, less vibration, less tilting when taking corners, and more comfort. These design features insulate drivers from the perception of danger when speeding and influences speeding behaviour. Vehicle safety initiatives have focused on reducing the severity of injuries arising from road crashes (secondary prevention) rather than on reducing the incidence of crashes (primary prevention) through measures aimed at reducing vehicle speed, such as speed limiters.

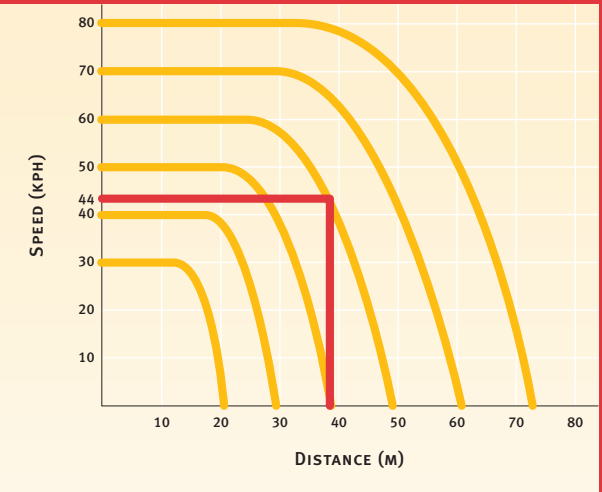
7 The roading environment can be altered to slow us down

How drivers perceive the road is a critical factor in speed reduction. Roadside development tends to slow traffic down, so drivers will tend to travel faster on open rural roads and slower on built-up urban roads. Speed humps, road narrowing, and chicanes, as well as road markings, can help reduce speed. To be effective, speed limits should be consistent with the design speed of the road and be backed up by enforcement.

8 People can't beat the laws of physics

The faster a driver travels on the road, the greater the risk the driver has of missing critical hazard cues. Upon recognising the hazard at the faster speed, the driver will travel further before applying brakes, and will travel further once the brakes are applied.

Speed versus distance for emergency braking from time=0



An example: Two cars travelling side by side, one car travelling at 50 kph and the other overtaking at 60 kph. A child runs onto the road at a point just beyond that at which the car travelling at 50 kph can stop. The other car will still be travelling at 44 kph at that point, a collision speed at which a pedestrian has more than a 50% probability of being killed or severely injured.

National Winter Urban Speed Survey, 1999

Urban speed, average	55.8 kph
Urban speed, 85th percentile	62.5 kph
Percentage of vehicles exceeding 50 kph	80.3%

Note: The 85th percentile speed indicates that 15% of vehicles travelled above this speed.

9 Slowing down loses very little time, it saves money, and it is good for the environment

Reducing average speed from 90 to 85 kph on a 10-km trip adds just another 23 seconds to travel time. Fuel efficiency starts to reduce noticeably at speeds above 90 kph. At high speeds and acceleration, the emission of several major pollutants rise due to increased power demands on the engine.

10 Enforcement protects New Zealanders from speeding drivers

Rigorous enforcement of speed limits not only leads to speeding drivers being apprehended and punished, but it also increases their perceived risk of being caught and deters them from speeding. Speed cameras can increase the certainty of apprehension and in New Zealand have reduced speeds and crashes in areas where they are deployed.

Introduction

The Accident Compensation Corporation (ACC) is committed to reducing both the number and severity of injuries on the road. With research assistance from the Land Transport Safety Authority (LTSA), ACC wants to dispel some myths about the impact of speed on New Zealanders' health and well-being.

This document provides a substantial research base to New Zealand's consideration of speeding as a safety issue, and the sorts of strategies that can be employed to reduce speed. It draws conclusions based on research and on injury prevention principles, and is the key resource for ACC's Down With Speed Programme.

The ten points outlined at the front of this document are being used as the basis for a series of presentations, and a supporting leaflet, promoted by ACC to a range of organisations within the community. Through the Down With Speed Programme, ACC hopes to increase understanding of the harmful impact that speeding has on our lives, and to encourage New Zealanders to do more to reduce that impact.

We need first to recognise that motor vehicles have provided individuals and communities with very high levels of mobility, by increasing the distance that is able to be travelled during any given period and decreasing the time it takes to get from one place to another. The increasing mobility that the world has seen over the last hundred years has, however, brought with it a terrific loss of life on the road. Tragically for those who survive road crashes, one of the greatest losses is often physical mobility itself. The mobility that motor vehicles provide comes at a very high cost to personal and community safety.

Speed is the central factor in any consideration of the trade-off between safety and mobility within the road transport system. This is because speed affects every part of the system. Roads are generally designed to safely facilitate travel at a specific speed. Vehicles are designed to allow people and goods to move at a range of different speeds depending on the circumstance. And people constantly make choices about the speed they drive a vehicle on a road.

In this document, speed is considered in terms of "excess speed and inappropriate speed". "Excess speed" refers to instances when vehicles travel in excess of the legally declared speed limit. "Inappropriate speed" refers to instances when vehicles travel at a speed that is unsuitable for the road and traffic conditions. As the European Transport Safety Council noted in its 1995 report, *"the distinction is important because a speed limit… declares [only] higher speeds to be illegal, and it remains for each driver to decide what speed, within the limit, is appropriate"* (p10).

Speed lies at the very heart of the road toll in New Zealand, and indeed in every other motorised country in the world. It is a core contributing factor to road crashes and the resulting death and injury toll. Even when speed is not necessarily a contributing factor in a road crash, however, it is a very important factor in determining the severity of the injuries, fatal or otherwise, resulting from the crash.

Reductions in the road toll over the last decade in New Zealand and around the motorised world have come from an increasingly scientific approach to road safety. This document is based explicitly on the quantitative research that has developed over the last thirty to forty years on the impact of vehicle speed on the safety of our road transport system. The primary reason for concentrating on quantitative research is to extract the essential elements from the area in such a way that leaves little room for argument that is not based on fact. This is because, unfortunately, we do not appear to adequately understand the nature of the problem, and discussion on speeding gets sidetracked away from the core safety problem.

The core safety problem is that we are simply driving too fast on our roads. Without the research information in front of us, we can explain our speeding by referring to the long, flat, straight piece of road that we were driving on. Without the research information, we can explain our speeding by referring to our above-average capacity to detect and respond to hazards. Without the research information, we can explain our speeding by referring to the superior occupant safety features in our car. Without the research information, we can explain our speeding by referring to our need to get from A to B "as soon as possible".

This document has been developed to put our research understanding at the front of our thinking about speeding. With the research information in front of us, we can start to recognise the limitations that New Zealand's roading network places on how fast we can safely drive. With the research information, we can start to recognise the limitations that our mental and physical functions place on the speed that we drive. We can also start to recognise the incongruity within the road transport system of motor vehicles that can drive twice as fast as the maximum speed limit. While based on scientific principles, therefore, this is not intended as an abstract document. It is intended to provide New Zealanders with the capacity to think again about how fast we drive on our roads, and about what we can do to reduce deaths and injuries on the road associated with speeding.

To prompt that rethink, we must first consider speeding as a safety issue, beginning with the basic principles of risk as they apply to speed. Part A of this document outlines the relationship between the speed we drive and the risk of crashing, before discussing the most beneficial means of managing the speed-crash risk. Part A also investigates the risk relationship between the speed we drive and the severity of the injury that will occur in a crash. We then examine the essential elements within the system that impact on our speeding behaviour – vehicles, roads, and people.

Part B focuses on design and engineering issues as they relate to vehicles and to roads. Our discussion on vehicle safety reviews improvements in occupant protection, which is relevant in terms of injury severity, and also considers safety benefits from reducing speed through engineering initiatives. This is followed by a discussion on road and traffic design and engineering. Relevant research issues here involve the application of speed limits and, particularly on rural roads, the design speed of the roading network. Some roadway treatments that have been shown to reduce speed are outlined.

After having examined basic issues associated with risk, and how the built environment of the vehicle and the road impacts upon speeding, Part C turns to how people respond in motor vehicles on roads. This discussion begins by looking at driver capability in identifying and responding to hazards

at different vehicle speeds, and then moves on to examining the use of enforcement as a response to drivers exceeding speed limits. The remaining sections in Part C address means of improving the effectiveness of enforcement activity.

Given the central role of speed within the road transport system, it is necessary to look beyond the central safety issue to develop a more complete understanding of speed. Part D addresses time considerations, fuel efficiency, and environmental impacts of speeding. Finally, Part E addresses speeding within a specifically New Zealand context. The breadth of research addressed in this literature review attests to the international recognition of speeding as a safety issue. It should also be acknowledged that New Zealand's roading environment presents a very particular set of issues regarding how fast we drive on our roads. The document concludes by laying these issues bare and providing a national overview of the trauma that speeding imposes on New Zealanders and of our attitudes towards this behaviour.

Part A

Risk, Speed, Crashes, and Injuries

Vehicle speed has a twofold effect on the safety of New Zealanders on our roads – it affects the risk of involvement in an injury crash and it affects the severity of the consequences of a crash.

To aid our understanding of the role speeding plays in the continuing toll of injury and death on our roads, it is useful to relate it to the role played by alcohol. Most New Zealanders have a basic understanding of the fact that a driver who is affected by alcohol is more likely to be involved in an injury crash than a driver not affected by alcohol. Similarly, at any point in time, a driver travelling at an excess or inappropriate speed is more likely to be involved in an injury crash than a driver travelling below the speed limit or at a speed that is more appropriate for the conditions.

The purpose of Part A of this review is to explain the scientific research and understanding that has built up over the years to inform us about the effects of increased speed on crash risk. As we shall see, there have been a number of approaches to studying this topic, and a number of different, sometimes conflicting, conclusions have been reached over the years. With the value of hindsight, re-examination of old studies, and introduction of new research findings, we explain the increased risk to road users that comes with increased traffic speed.

Speeding is directly linked to the severity of injuries that arise from crashes, regardless of whether speed was a reported cause in the crash. This opening discussion on risk therefore concludes with an examination of the direct link between the speed of vehicles involved in crashes and the severity of injuries resulting from those crashes.

The research findings discussed in this Part allow us to develop a clearer perspective on how to reduce the risk that vehicle speed contributes to New Zealanders being killed and injured on our roads. Ways to reduce this risk will be taken up in later Parts of this document.

1: The Relationship between Vehicle Speed and Crash Risk

The relationship between vehicle speed and the risk of involvement in a crash has been a topic of interest for some time in the road safety literature[1]. One useful explanatory research approach has been to compare the speeds of vehicles involved in crashes with the speeds of control vehicles (those not involved in a crash). Another approach has been to investigate the relationship between crash risk and variations in the speeds of vehicles on stretches of road. The findings from these approaches are set out below, along with the findings of two further approaches, evaluating the relationship between driver speed and crash history and discussing the principles of physics in relation to speed.

An important point to bear in mind when considering the data that follow is the distinction between urban roads, rural roads, and motorways/highways. The urban roads in these international studies are those in cities and residential areas and tend to have speed limits of around 50 to 60 kph. The rural roads referred to are those between cities and towns, with open-road speed limits (generally 80 kph and above). Motorways and highways have speed limits that range from 100 to 130 kph. German autobahns are not subject to a national speed limit, but some have a local speed limit, some sections are subject to variable speed limits (such as speed limits in bad weather), and there is an advisory speed limit of 130 kph. The distinction between data from these road types is important because different patterns are sometimes found.

1a: Comparing Speeds of Vehicles Involved in Crashes and Control Vehicles

The earliest research approach to examining the relationship between vehicle speed and crash involvement was to obtain data on the speeds of crash-involved vehicles prior to the crash (for example, from police reports or by interviewing the driver). These data were then compared with data on the speeds of control vehicles that were not involved in a crash but were in similar circumstances to the crash-involved vehicles (for example, they were on the same

road at the same time of day). Although Kloeden, McLean, Moore, and Ponte (1997) considered this approach to be the strongest theoretically, there are practical problems inherent in the approach – particularly, in accurately determining the pre-crash speeds of vehicles and in finding an appropriate control group – that have limited its usage. Furthermore, once the results are obtained, careful interpretation is needed that takes into account the complexities of the road and traffic environment[2].

Solomon and the U-Shaped Curve

The first significant study using an approach that allowed an examination of the relationship between vehicle speed and crash risk was conducted in the USA in the 1950s (Solomon, 1964). Solomon examined the reports of 10,000 crashes that occurred on 35 sections of rural highway (a total of 600 miles) from 1955 to 1958. In most cases, the crash reports contained an estimate of the pre-crash speed of the crash-involved vehicle[3], as obtained from the driver, the police, or witnesses (in 20% of cases, vehicle speed was estimated based on details in the report). To obtain the control vehicle speed, the speeds of 290,000 vehicles not involved in crashes were measured (in 1957 and 1958) at one location on each of the 35 sections of highway, and the mean speed for each section was calculated. Solomon then calculated the degree to which the estimated pre-crash speed of each crash-involved vehicle deviated from the mean speed of the control vehicles[4] on the section of highway where the crash occurred. When deviation from mean speed was plotted against crash involvement rate per hundred million vehicle-miles of travel[5], a U-shaped curve was found. That is, where speeds deviated greatly from the mean speed – either faster or slower than the mean speed – crash involvement rates were high, whereas speeds close to the mean speed had low crash involvement rates[6].

The highways on which the crashes occurred had a number of access points (including intersections and driveways) and were likely at times to experience congestion. The crashes at low speeds were generally due to these factors. For example, of the low-speed daytime crashes (at 22 mph (35 kph) or less), 47% were rear-end crashes (which are typical of congested conditions) and 38% were angle crashes (which typically occur at intersections). In these crashes, the drivers were not travelling at free speeds – that is, the driver's speed was impeded by the congestion or the controls at the intersection and was not necessarily the driver's chosen speed of travel on the rural highway. Hence, the high crash involvement rate found at slow speeds cannot be interpreted as indicating there is a high chance of crashing when a driver chooses a slow travel speed along a rural highway. Instead, it may be interpreted as indicating that a high number of crashes occur when travel speed is slowed by congestion or a high number of access points.

This problem with the interpretation of these data does not occur with the high-speed data. Solomon found, for example, that, as the speed of the crash-involved vehicles increased, particularly above 50 mph (80 kph), the number of single-vehicle crashes increased. As will be discussed later, single-vehicle crashes typically occur at high speeds, when the driver loses control of the vehicle. Unlike many of the drivers travelling at low speeds, those travelling at high speeds are able to choose their speed of travel, as their choice of speed is not restricted by the traffic conditions. Thus, the high crash rate at speeds above the mean can be more appropriately interpreted as indicating there is a high crash rate when drivers choose to travel at high speeds.

Injury Risk

As well as a high crash risk when drivers choose to travel at a high speed, there is also a high risk of injury if involved in a crash. For example, when Solomon analysed the number of people injured per 100 crash-involved vehicles by the speed of the vehicle, the left side of the previously U-shaped curve was eliminated, leaving only the right side

1 The following summary is based primarily on reviews conducted by Kloeden, McLean, Moore, and Ponte (1997), Fildes and Lee (1992), and the Transportation Research Board (1998). Generally, these reviews cited and discussed the same research papers and reached the same conclusions. In cases where a paper was cited in only one of these reviews, attempts were made to obtain that paper. In some cases, the paper concerned could not be obtained in time for inclusion in the present review.

2 For example, Maycock, Brocklebank, and Hall (1998) found that 77% of the variation in observed speeds on different trunk roads in Great Britain was due to road type, road geometry, and weather and road surface conditions. In the following studies, it is not always clear whether different road factors have been controlled for when comparing crash-involved and control vehicles.

3 The pre-crash speed of the crash-involved vehicle is the speed at which the vehicle was travelling before the driver became aware of the impending crash.

4 The deviation from the mean (or average) speed for each section of highway included vehicles travelling slower than, as well as faster than, the mean speed. A crash-involved vehicle travelling at the mean speed had a deviation score of zero, those travelling faster than the mean speed had positive scores, and those travelling slower than the mean speed had negative scores.

5 The crash involvement rate per hundred million vehicle-miles of travel took into account the measured traffic volume on each section of highway.

6 The way Solomon calculated the mean speed (and hence each crash-involved vehicle's variation from the mean) is an important point to note as it indicates a methodological flaw in his study. This is discussed in more detail later in this sub-section.

of the curve, or a consistently increasing slope (see Figure A1). That is, the number of people injured per 100 crash-involved vehicles increased with increasing speed.

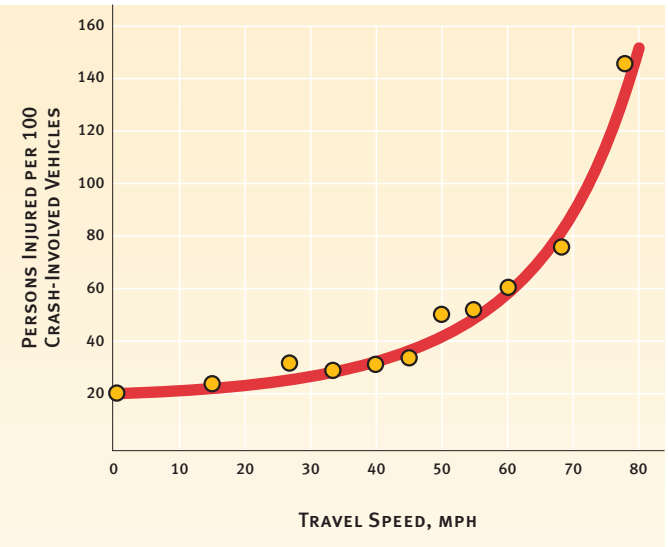


Figure A1 – Number of people injured per 100 crash-involved vehicles

Source: Solomon (1964, p11).

Further Research on the U-Shaped Curve

The U-shaped relationship between deviation from mean traffic speed and crash involvement was also found by Cirillo (1968). Cirillo examined speeds and multiple-vehicle crashes on rural and urban interstate highways in the USA. Cirillo used Solomon's method of measuring the speeds of control vehicles at one location on each highway, calculating the mean speeds, and calculating speed variation as the deviation of the speed of each crash-involved vehicle from the mean for that section of highway. As with Solomon's study, Cirillo's data showed a very high crash rate at speeds much slower than the mean (as well as above it). Cirillo also found, however, that crash rates were highest for sections of the highways closest to interchanges. This finding was taken to (at least partly) explain the high number of crashes at low actual speeds.

There are a number of flaws in Solomon's and Cirillo's studies that limit the conclusions that can be drawn from them. For example, because the pre-crash speeds were often estimated by the drivers or the police, the accuracy of the estimates of vehicle speeds is doubtful, and the estimates used are likely to be underestimates of actual crash speeds[7].

The Research Triangle Institute (RTI, 1970) attempted to reduce the weaknesses in Solomon and Cirillo's approach. They obtained more reliable speed estimates of the crash-involved vehicles on state highways and county roads in Indiana[8]. Also, because turning vehicles tend to have to slow down or stop in order to turn (and hence their crash rates are not representative of drivers choosing to travel at a slow speed[9]), crashes involving turning manoeuvres were excluded from the analysis. Although a U-shaped pattern was found, crash involvement rates at speeds lower than the mean speed were not as high as those of Solomon's study.

West and Dunn (1971) analysed the data from the RTI (1970) study further, by including only the crash-involved vehicles for which there was a measurement of speed prior to the crash. For purposes of comparison with the RTI study, all crashes involving turning vehicles were also removed from the analysis. With the less accurate speed data and data on turning vehicles removed, a weakened U-shaped curve was found and the elevated crash risk at speeds much lower than the mean disappeared.

In addition to the criticisms of the Solomon and Cirillo studies referred to above, a number of other reviewers (Fildes and Lee, 1992; Kloeden et al, 1997; Transportation Research Board, 1998) have identified other biases and methodological flaws in these studies. Some of the flaws arose because they did not use a matched control group[10]. Matched control group data would comprise the measured mean traffic speed

7 Furthermore, in Solomon's study, in 20% of the crash reports there was no estimate of vehicle speeds, and the speeds had to be deduced from the information given.

8 For the first eight months of the study, speed estimates for crash-involved vehicles were obtained from experts' on-site assessment of the crash. At that time, however, a new computer-sensor system was developed that enabled the measurement of the speed of traffic and of individual vehicles. The sensors were embedded at 16 points along the main highway in Indiana. So, during the last few months of the study, it was possible for the researchers to use this computer system to identify crash-involved vehicles or the platoon in which they had been travelling and obtain their respective pre-crash speeds.

9 Crashes involving turning vehicles may occur, not as a result of the turning vehicle's (slow) speed, but instead because the driver misjudged the gap required to turn across the path of an approaching vehicle that was travelling at excess speed. In this scenario, the crash is due to driver misjudgement and the excess speed of the other vehicle. Hence, including vehicles turning at low speeds in an analysis of crash involvement by speed may falsely give the impression that vehicles travelling at low speeds have a high risk of crashing due to their speed.

10 Research designs that included matched control groups were not in common use in the 1950s when Solomon undertook his study. Given that his study included data from 10,000 crashes, obtaining a matched control would have been a huge undertaking.

at each location where each crash included in the crash data had occurred. Where possible, the mean speeds would be measured at the same time of day and day of week as the crashes had occurred (and under the same road and weather conditions). Deviation from the mean speed would then be calculated individually for each crash-involved vehicle and aggregated to show the risk of crash involvement at each degree of variation from mean traffic speed. West and Dunn's (1971) attempt to remove the bias towards crashes at speeds greatly below the mean by removing the data on turning vehicles did not fully address the issue[11] but did highlight the extent to which these crashes are over-represented in the data.

Overall, the weaknesses in the early research gave the impression that drivers travelling at low speeds have a high risk of crashing **because** of this low speed. As discussed, the relatively high crash-involvement rate of these drivers is often due to other factors, such as congestion and inter-section points. However, the weaknesses in the studies did not diminish the finding that the risk of crash involvement on rural highways increases with increased speed above the mean traffic speed. Another unchallenged finding of the early research was that the number of injuries from a road crash increases with the increasing speed of the crash-involved vehicles.

Recent Australian Research

A more recent study examined the relationship between speed and crash risk on urban roads in Australia. Kloeden, McLean, Moore, and Ponte (1997) conducted a study in Adelaide's 60-kph metropolitan area, using crash data and matched control data. The main criterion for inclusion of crash-involved vehicles in the data was involvement in a crash where at least one vehicle occupant was transported from the crash scene by ambulance. Crashes involving illegal manoeuvres and those in which alcohol was a factor were excluded from the study, as were crash-involved vehicles not travelling at free speeds[12]. The control vehicles were four vehicles travelling at free speeds in the same direction as the crash-involved vehicle, at the same location, at the same time of day, on the same day of week, and under the same weather conditions as the crash. The speeds of the crash-involved vehicles were estimated using crash reconstruction techniques[13] and compared to the control vehicle speeds[14]. Only vehicles in crashes in which there was sufficient information to carry out the computer-aided crash reconstruction could be included.

Kloeden et al (1997) found that, in general, the crash-involved vehicles were travelling faster than the control vehicles. Figure A2 shows how travelling speed affects the risk of involvement in a crash in which casualties occurred, relative to a speed of 60 kph (the speed limit). Significantly, Kloeden et al found that above 60 kph the risk of involvement in a casualty crash increases exponentially; that is, with each 5 kph increase in travelling speed, the risk of involvement in a casualty crash approximately doubles. The researchers estimated that a large proportion of the crashes in the study could have been avoided had the crash-involved vehicle been travelling at a slower speed.

Kloeden et al's (1997) study represents a new under-standing of the relationship between speed and crashes on urban roads[15]. It is important to note, however, that the relationship relates only to crashes in which there was an injury severe enough to require hospitalisation; hence the study is biased towards high-speed crashes and the crash rates at low speeds may be understated. Another weakness, acknowledged by Kloeden et al, was that the pre-crash speeds were estimated rather than measured. Hence, despite the high reliability of the crash reconstruction technique, there may be an unknown bias. Overall, though, the study by Kloeden et al demonstrated that the higher the speeds in urban areas, the higher the risk of crashing.

11 To fully address this issue, it would be necessary to select control vehicles that were performing the same turning manoeuvre as the crash-involved vehicle, measure the speeds of those vehicles, and compare the speed of the crash-involved vehicle with the mean speed of the control vehicles.

12 That is, vehicles slowed by traffic, vehicles slowing to execute a manoeuvre, and vehicles accelerating away were not included. These exclusions "*aimed to ensure that the association between travelling speed and crash involvement was not confused by the inclusion of vehicles executing (necessarily slow) manoeuvres or [giving way]*" (Kloeden et al, 1997, p27). Vehicles involved in rear-end crashes were also not included in the study; these crashes are usually due to drivers misjudging safe following distances for the speed travelled rather than to speed per se. Further, physical conditions were controlled for as far as possible by not including crashes that occurred while it was raining, and not including crashes on sections of road with advisory speed signs (advising motorists to travel at less than 60 kph).

13 The crash reconstruction technique used was "SMAC" (Simulation Model of Automobile Collisions). SMAC is a computer reconstruction program developed on the basis of physical testing and studies of vehicle dynamics.

14 The control vehicle speeds were measured with a laser speed gun. Checks were made to ensure motorists were not warning others about the presence of the laser gun.

15 The study specifically relates to 60-kph speed limit areas. A more extensive study involving a variety of speed limits would be needed to enable generalisation of the results to all speed limit areas.

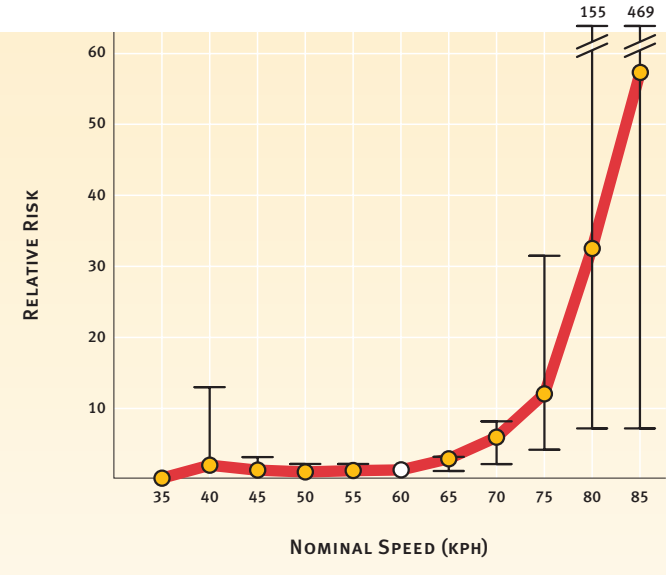


Figure A2: Travelling speed and the risk of involvement in a casualty crash relative to travelling at 60 kph in a 60-kph speed-limit zone

Source: Data for figure generated from Kloeden et al (1997, Table 4.3, p37).
Notes: Relative risk at 60 kph set at 1.00. 95% confidence intervals are shown by the vertical lines.

Explaining Travel Speed and Crash Risk

Kloeden et al (1997) went on to analyse why increased travel speed increases crash risk. The most common crash types they observed were an oncoming vehicle turning right across the path of vehicles travelling at free speeds and a vehicle turning right from a side street across the path of vehicles travelling at free speeds. Kloeden et al hypothesised that these crashes occurred because the approaching vehicle was travelling at excess speed and the turning driver misjudged the gap because he or she mistakenly assumed the approaching vehicle was travelling at about the same speed as the other free-flowing traffic on the road.

Kloeden et al stated that related vehicle speed factors *"often have a cumulative… effect on the risk of involvement in a casualty crash. For example, a speeding vehicle is likely to have its speed misjudged by another driver, thereby creating a crash situation, in which the speeding vehicle will travel further during the reaction time of its driver, will lose less speed under emergency braking, and will crash at a comparatively greater speed with much greater crash energy"* (p48).

Another finding by Kloeden et al (1997) was that drivers travelling at very high speeds (above 90 kph in a 60-kph zone) had an extremely high risk of losing control of the vehicle and of subsequent crashes and injuries. In New Zealand, loss of control is the most common type of crash in which speed is identified as a contributing factor, in both urban and rural environments (see Part E).

Comparing Speed Risks and Alcohol Risks

A further significant element that Kloeden et al (1997) explored was the crash risk of speeding in a 60-kph speed limit zone compared with the crash risk of driving after consuming alcohol. They reported a previous study conducted in Adelaide by McLean, Holubowycz, and Sandow (1980, cited in Kloeden et al, 1997) that related the risk of crash involvement to a driver's blood alcohol concentration (BAC)[16]. Kloeden et al concluded that quite small increases in speed result in an increase in the relative risk of crash involvement that is comparable to illegal blood alcohol levels. A 5-kph increase in speed above 60 kph (in a 60-kph zone) increases the risk of a casualty crash by roughly the same amount as an increase in blood alcohol concentration from 0 to 50 mg/100 ml. The results are summarised in Table A1 and Figure A3 below. An example of comparable relative risk is the risk of involvement in a casualty crash when travelling at 70 kph in a 60-kph zone or when driving with a BAC of 80 mg/100 ml.

Speed (kph)	Speed Relative Risk	BAC (mg/100ml)	BAC Relative Risk
60	1.0	0	1.0
65	2.0	50	1.8
70	4.2	80	3.2
75	10.6	120	7.1
80	31.8	210	30.4

Table A1 – Comparing relative risks of involvement in a casualty crash for speed and alcohol

Source: Adapted from data in Kloeden et al (1997, p54).
Notes: BAC = blood alcohol concentration. The relative risk for speed is relative to 60 kph in a 60-kph zone; the relative risk for BAC is relative to zero mg/100 ml. Blood alcohol concentration is converted to New Zealand units (milligrams of alcohol per 100 millilitres of blood, mg/100 ml). 80 mg/100 ml is the legal limit in New Zealand.

16 In the speed data, the researchers excluded the crash data of alcohol-affected drivers (in fact, they recorded the data during the day and found few such cases). It is not known whether speed was controlled for in the alcohol data.

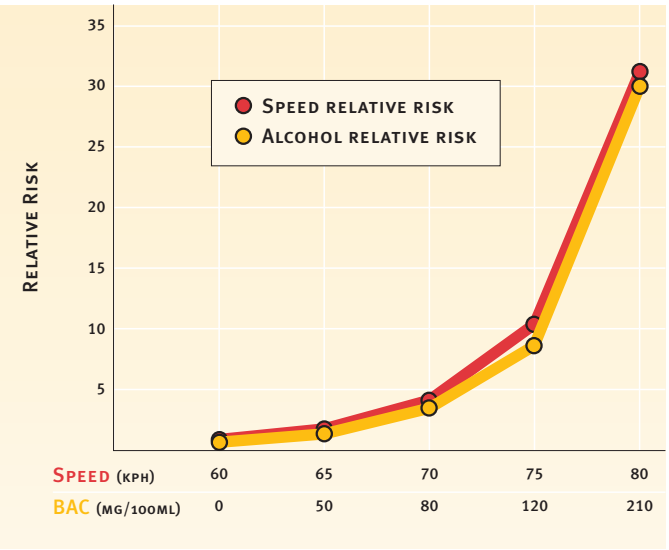


Figure A3 – Relative risks of involvement in a casualty crash for certain speeds and with certain levels of blood alcohol concentration (BAC)

Source: Data for figure generated from Kloeden et al (1997, Table 5.2, p54).
Notes: The relative risk for speed is relative to 60 kph in a 60-kph zone; the relative risk for BAC is relative to zero mg/100 ml.

Although there are useful parallels to be drawn in the relationship between driver consumption of alcohol and crash risk and the relationship between vehicle speed and crash risk, it is important to bear in mind that alcohol and speed increase crash risk for quite different reasons.

Alcohol increases crash risk through a combination of factors. For example, alcohol-affected drivers are unable to perform multiple tasks; therefore, they have difficulty responding to hazards that appear in their path. The crash risk for alcohol-affected drivers is also increased because they are less risk-adverse and less able to withstand peer pressure. Furthermore, alcohol-affected drivers have slower reaction times, which affects both their risk of crashing and the consequences of a crash.

Speed also increases crash risk through a combination of factors – such as the reduced time available to detect and respond to hazards in the driving environment and the increased stopping distance. Furthermore, if there is a small deviation in the direction of travel, then the risk of leaving the road and crashing increases with increased speed. As will be discussed later, the consequences of a crash also increase with increasing speed.

A further difference between alcohol and speed in terms of crash risk is the length of time that the increased risk exists. After a person drinks alcohol, the blood alcohol concentration remains elevated until the body is able to process the alcohol and remove it from the blood (this process can take several hours). Thus, an alcohol-affected driver will present a higher crash risk over a sustained period of time – generally for the entire journey. By contrast, a speeding driver can increase the crash risk in a more transient manner. Through changing his or her speed over a journey, a driver can increase the crash risk significantly over short periods of time and can maintain a relatively low level of risk at other times during the journey.

1b: Comparing Crash Rates after Changes in Mean Speed and Speed Variation

Another approach to understanding and explaining the relationship between speed and crash risk is to examine crash rates before and after a change in speed limit. One of the criticisms levelled at this approach is that the studies have often not taken into account other factors (aside from the speed limit change) that may affect crash rates, particularly the level of enforcement of and compliance with the new speed limits (Kloeden et al, 1997), and this may weaken the findings to a degree. In spite of any weaknesses in the studies, however, this approach adds to our overall understanding of the speed-crash relationship through use of actual crash data and formulae to show the expected effects of a traffic speed change on crash rates.

The New Zealand Experience

During December 1973, New Zealand imposed an open-road speed limit of 50 miles per hour (mph) (80 kph) as a fuel-saving measure. Before this time, the speed limit was set at either 55 or 60 mph (88 or 97 kph). Due to concern over the fuel shortages, compliance with the new speed limit was high; hence there was an 8- to 10-mph reduction in rural mean speeds when the limit was imposed. The drop in speeds led to a significant reduction in injuries compared to roads unaffected by the speed limit change (that is, urban roads) (Frith and Toomath, 1982). The drop in mean speeds was also associated with a sharp contraction in the distribution of speeds.

Following the oil crisis, mean speeds on the open road began to increase again to pre-1973 levels. On 1 July 1985, the open-road speed limit was increased to 100 kph. Since speeds prior to the increase had been high, the change in

speed limit did not result in a subsequent increase in crashes (Jones, Derby, and Frith, 1986). These findings suggest that speed limit increases or decreases are only likely to change crash rates if they are accompanied by mean speed changes.

International Experiences

Interstate highways in the USA have been the largest area of study of changes in speed limits. In 1974, again in response to the oil crisis, the National Maximum Speed Limit (NMSL) for highways was introduced and set at 55 mph (88 kph). Before the introduction of the NMSL, states set their own speed limits, and these were generally higher than 55 mph. Several studies examined the effect of the new speed limit on road safety. The Transportation Research Board (TRB, 1984) reviewed these studies and found that the lower speed limit reduced both travel speeds and fatalities, but that compliance with the speed limit decreased over time.

The NMSL was raised to 65 mph (105 kph) in 1987. Following the change, 40 states raised their speed limits to the new maximum. The effect of the change was examined by a large number of studies at both the national and state level. A review of these studies by the TRB (1998) concluded that *"raising the speed limit led to an increase in both rural interstate fatalities and fatal crashes"* (p118). For example, one study conducted by Garber and Graham (1989, cited in TRB, 1998) that controlled for many other variables that affected highway safety found that, across the 40 states that raised their speed limits, there was a 15% increase in fatalities on interstate highways.

Finch et al (1994) also reviewed the NMSL change from 55 to 65 mph. They concluded that *"the immediate effect [of] raising the limit has been to increase average car speeds by about 3 mph; the effect is not constant, but varies from state to state"* (p12). They found that this mean speed change increased fatalities by about 20% to 25%, which was estimated to correspond to an extra 500 lives lost per year.

In 1995, the NMSL was repealed, again allowing states to set their own speed limits. Several states raised their speed limits almost immediately. An evaluation by the National Highway Traffic Safety Administration (NHTSA, 1998) reported that *"it is estimated that… the 32 states that increased [interstate] speed limits experienced approximately 350 more fatalities than would have been expected based on historical trends, about nine percent above expectations"* (p56).

Other countries have conducted similar studies on speed limit changes. A review of the studies from several countries (South Africa, Belgium, Finland, France, Great Britain, Germany, USA, and New Zealand) where a speed limit was reduced or established prior to 1981 found a reduction in road crashes ranging from eight percent to 40% (Fieldwick, 1981, cited in Fildes and Lee, 1994).

One of the most recent evaluations of changes in speed limits examined the change from 100 to 110 kph on Melbourne's rural and outer freeway network in 1987 and the change back to 100 kph in 1989. Sliogeris (1992) found that, compared to a control group of all other roads in Victoria that remained at 100 kph between 1987 and 1989, the injury crash rate per kilometre travelled increased by 24.6% following the change from 100 to 110 kph, and decreased by 19.3% following the change back to 100 kph.

There is a consistent finding from the studies referred to above that shows that increasing the speed limit increases crash, injury, and fatality rates and that decreasing the speed limit can reduce these rates.

Nilsson and the Fourth Power of Speed

One highly reported piece of research comparing speeds and the risks of crash involvement before and after a speed limit change was undertaken by Nilsson (1982).Nilsson combined a number of evaluations of increases and decreases in speed limits in Sweden between 1968 and 1972 to validate a model for estimating the effect of changes in traffic speed on road safety. The model was further validated by applying it to data from other studies of speed limit changes in Sweden, Denmark, and the USA.

The model used the physics law[17] relating to kinetic energy (the energy that something has by virtue of being in motion) – that is:

$$\text{kinetic energy} = \tfrac{1}{2} \times \text{mass} \times (\text{speed})^2.$$

17 The physics law is based on the following probabilities:
(a) The probability of a personal injury accident in the road system reported by the police is proportional to the square of the speed (v^2), which is a shortened formula for the kinetic energy.
(b) The probability of a fatal accident resulting from a personal injury accident is also proportional to the square of the speed (v^2), which means that the number of fatal accidents is proportional to the fourth power of the speed (v^4) (cited in Andersson and Nilsson, 1997, p6).

Nilsson's model was that, if v_a = mean or median traffic speed before the change of speed limit and v_b = mean or median traffic speed after the speed limit change, then:

- the number of all injury crashes after the change = $(v_b/v_a)^2$ x the number of all injury crashes before;
- the number of fatal and severe crashes after the change = $(v_b/v_a)^3$ x the number of fatal and severe crashes before;
- the number of fatal crashes after the change = $(v_b/v_a)^4$ x the number of fatal crashes before.

Figure A4 below, which plots Nilsson's formula, demonstrates that there will be twice as many fatal crashes when the mean speed is 120 kph than when it is 100 kph.

More information about the effects of crashes, including their impact on the human body, will be discussed in Section 3 of this Part of the present review.

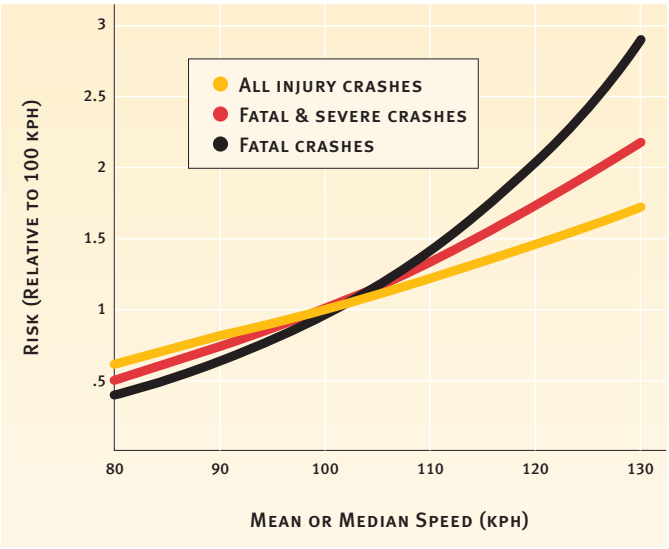


Figure A4 – Risk of crashing relative to a mean or median speed of 100 kph

Source: The figure was generated using Nilsson's (1982) formula.

Another statistical relationship between mean speed and crash risk was reported by Finch et al (1994). They examined studies from Finland, Germany, Switzerland, and the USA in which there was a change in mean traffic speed. Using multivariate linear and non-linear regression techniques on the data in the studies, they found that *"for every 1 mph rise in the mean traffic speed, the percentage change in [crashes] rises by about five percent"* (p18). This relationship applied to both urban and rural roads.

More recently, the Transport Research Laboratory (TRL) conducted extensive research into the statistical relationship between speed and crash frequency (Lynam, Baruya, Taylor, and Finch, 1999, cited in Silcock, Smith, Knox, and Beuret, 1999). They demonstrated that a 1 kph reduction in mean speed can produce up to a three-percent reduction in crashes. This finding was consistent with many studies of speed changes. They reported, however, that the risk of crashing varies depending on the road type (see Figure A5). For example, the elevated crash risk occurs at higher speeds on semi-rural link roads than it typically does on inner city link roads. This finding very much reflects the design speeds of the different road types and, therefore, the safe travel speeds on those roads.

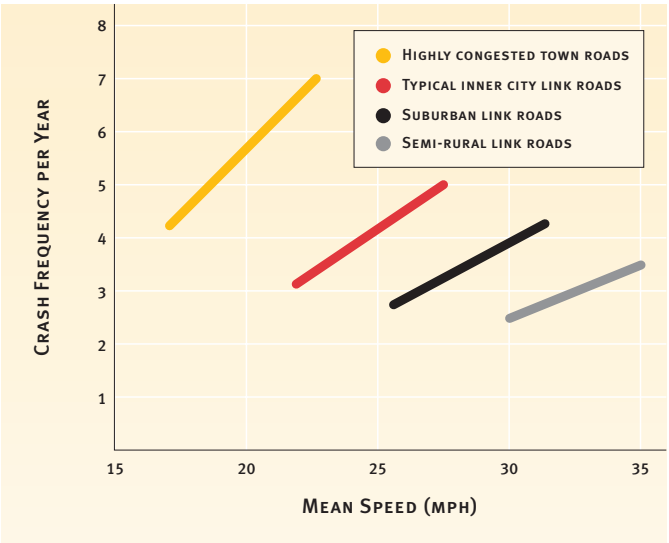


Figure A5 – Speed-crash relationship on UK urban roads

Source: Lynam et al (1999, cited in Silcock et al, 1999, p3).
Note: The speeds in the figure, when converted to kilometres per hour, are approximately as follows: 15 mph = 24 kph, 20 mph = 32 kph, 25 mph = 40 kph, 30 mph = 48 kph, 35 mph = 56 kph.

The evaluations of speed limit changes have indicated that increasing a speed limit can increase crash rates, while decreasing a speed limit may decrease crash rates. The effect is, however, very much dependent on the mean speeds before and after the speed limit change. Formulae have been developed by Nilsson, Finch et al, and Lynam et al to show the relationship between the change in the mean or median speed and crash data. Although the formulae are not exactly the same, they all indicate that an increase in the mean speed of traffic produces an increase in crash rates. Nilsson's formula also indicates that a decrease in the mean speed will produce a reduction in crash rates.

Mean Speed and Traffic Speed Variation as Crash Factors

In Section 1a, we discussed how some researchers have investigated the relationship between crash risk and the degree to which the speed of the crash-involved vehicle deviated from the speed of surrounding traffic. Other researchers have looked at speed variation in a different way; that is, they have looked at the distribution of speeds at a point on a stretch of road.

It is important to understand that speed variation in this context refers to variability in a stream of traffic. Therefore, it can only be a factor in crash risk if there are at least two vehicles interacting (and travelling in the same direction) on a stretch of road. When there is only one vehicle on the stretch of road, there is no speed variation. On New Zealand's rural roads, for example, it is not unusual for there to be only one vehicle using a particular stretch of road. However, a large number of crashes still occur when the crash-involved vehicle is the only vehicle on the road, but these single-vehicle crashes are not due to variations in the speeds of vehicles on the road. Hence, traffic speed variation can never account for 100% of the crash risk in a stream of traffic. Andersson and Nilsson (1997) point out that, when using statistical measures of mean speed and speed variation to explain or predict crash risk, it is very difficult to isolate the relative effects of these two factors. They go on to state: *"The speed variance can be attributed to a limited part of the road [crash] problem, while the [mean] speed level affects every [crash], particularly [in terms of] injury consequences"* (p9).

Early research on speed variation found that crashes were more likely to occur on roads with skewed speed distributions than on roads with normal speed distributions[18] (for example, Taylor, 1965, and Krzeminski, 1976, both cited in Kloeden et al, 1997). However, these findings have been criticised for the absence of important information that may have influenced the crash pattern, such as the causes of the skewed distribution or whether the skewness was positive or negative (Kloeden et al, 1997).

More recently, Garber and Gadirau (1988, cited in Kloeden et al, 1997) measured crash rates, speed variation, and mean speed on 36 sections of interstate highways in Virginia. Each section of highway had a posted speed limit of 55 mph, but the design speeds[19] across the sections ranged from 40 to 70 mph. Garber and Gadirau found overall that, as mean speed increased, crash rates decreased. That is, the sections of highway with the highest mean speeds were safer than the sections with lower mean speeds. This finding is explained by the observation that the sections of highway with the highest mean speeds were those with the higher design speeds (that is, these sections were designed to accommodate higher speeds). They also found that crash rates increased with increasing speed variation. However, Kloeden et al suggest this relationship may also be related to the design features of the road. That is, better designed roads have low crash rates because provision is made for overtaking and turning vehicles, therefore lessening the situations that lead to large speed variation. A further criticism of the study made by Kloeden et al was that the measure of speed variation appeared to be dependent on a small number of slow vehicles at a site. At one location, the slowest two percent of vehicles accounted for 47% of the speed variance.

In his analysis of speed variation effects across a range of road classes in 48 states of the USA, Lave (1985, cited in TRB, 1998) defined speed variation as the difference between the mean speed and the 85th percentile speed (the speed at or below which 85% of vehicles were travelling). Using multiple regression, Lave found that speed variation was significantly related to fatality rates for rural interstate highways and rural and urban arterial routes; that is, the greater the speed variation, the higher the fatality rate. This finding is not surprising given that speed variation was measured as the difference between the 85th percentile speed and the mean speed. That is, when this difference was large, it meant that the fastest vehicles were travelling at very high speeds compared to when the difference was small, and, as we have seen, with higher travel speeds, the fatality rate is higher. Kloeden et al (1997) criticised Lave's study because the regression model did not fit these data very well. Furthermore, the regression approach may have given more weight to speed variation than to mean speed for purely mathematical reasons, which leaves some doubt as to which of the two variables is the primary causal variable.

Baruya and Finch (1994, cited in Kloeden et al, 1997) studied crash rates on Britain's rural roads and looked at whether mean speed or speed variation was the stronger contributing factor to crashes. In investigating this relationship, they found that the coefficient of variation (the standard deviation of the distribution divided by the mean speed) and mean speed had a counterbalancing effect – that is, on roads where mean speed was relatively high, the coefficient

18 Normal distributions are symmetric, single-peaked, bell-shaped density curves (Moore and McCabe, 1993). The mean is located at the centre of the symmetric curve and is the same as the median. A skewed distribution, however, is asymmetric so that it peaks at one end of the graph and has a tail that trails off at the other end. The mean is pulled towards the long tail of a skewed distribution more than is the median because of the influence of values far out in the tail.

19 Design speed is the speed judged to be the maximum safe travel speed under favourable conditions. It was used in the study to reflect the geometric characteristics of a section of highway.

of variation tended to be comparatively low. This finding is not surprising given that there are natural and mechanical limits on the speed at which people can travel on a road. Significantly, however, Baruya and Finch found that the effect of mean speed on crash rates was stronger than the effect of speed variation. This was particularly true when the distribution on the road was non-normal, as it often is in low-speed urban environments because of situational factors such as junctions, crossings, or congestion.

One methodological problem with Baruya and Finch's study, identified by the Transportation Research Board (TRB, 1998), may limit their hypothesis of the relationship between mean speed and speed variation – the speed data were collected in 1992 and 1993, but the crash data were collected from 1983 to 1988. A more recent study does, however, provide some support for their hypothesis. Schmidt (1996, cited in Kloeden et al, 1997) used statistical modelling to examine crash rates on two-lane rural roads in Germany. The alignment and width of the carriageway[20] and the median traffic speed explained approximately half the variance in crash rates on the different roads. Speed variation (the standard deviation of the speed distribution) did not contribute any additional predictive capacity to the model.

Changes in Mean Speed and Speed Variation

The above studies focused on the importance of speed variance over mean speed on crash rates. A more meaningful approach is to discuss the combined effects of mean speed and speed variance on crash rates, since they are inter-related. Although approaches to managing mean speed and speed variation will be discussed further in Section 2, it is useful here to illustrate graphically the effect on the speed distribution of reducing mean speed and/or speed variance.

Figure A6 demonstrates graphically the effect of a reduction in mean speed on a speed distribution, when the speed variance remains constant. As discussed in detail in Section 1b, a reduction in mean speed, such as that indicated in Figure A6, will reduce crash rates.

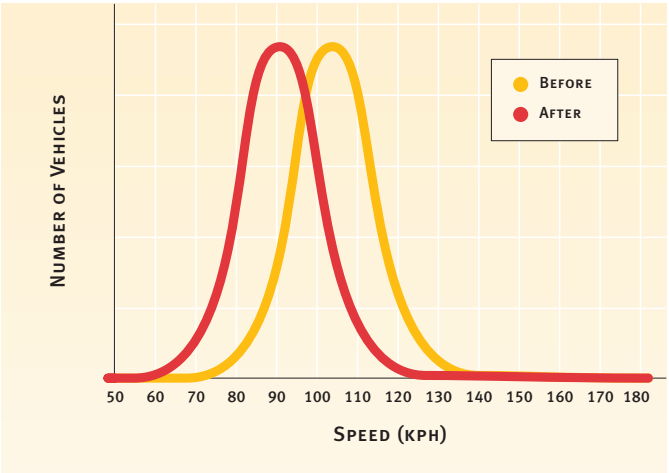


Figure A6 – A change in mean speed from a high mean speed (before) to a lower mean speed (after)

Note: The figure has been produced for illustrative purposes and does not represent any real data.

Another approach is to reduce the variability of the speed distribution without changing the mean speed (see Figure A7). This approach means there are fewer drivers travelling excessively above the mean speed, which reduces the crash risk, particularly for those drivers.

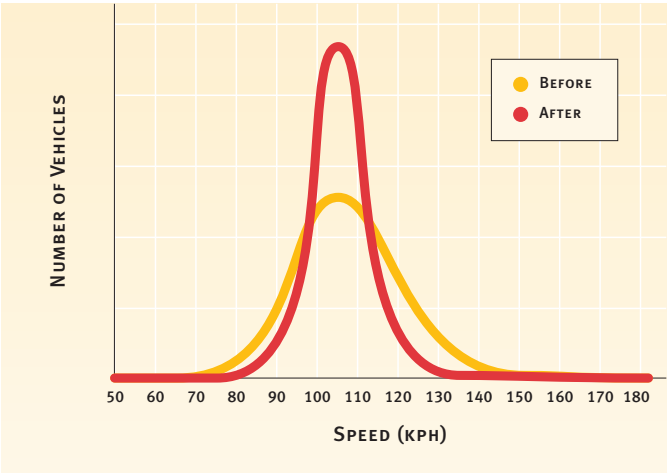


Figure A7 – A change in speed distribution from a wide speed distribution (before) to a slimmer speed distribution (after)

Note: The figure has been produced for illustrative purposes and does not represent any real data.

20 The carriageway is the part of the road (or lane) on which vehicles travel. The carriageway does not include the shoulders of the road (the edges) or any median strip (space in the centre of a two-way road).

Instead of reducing only the mean speed or only the speed variance, it is possible to reduce both at once. Figure A8 demonstrates graphically the effect of a reduction in both mean speed and speed variance. As can be seen from the figure, when mean speed and speed variance are reduced, there are even fewer drivers travelling at speeds excessively above the rest of the distribution.

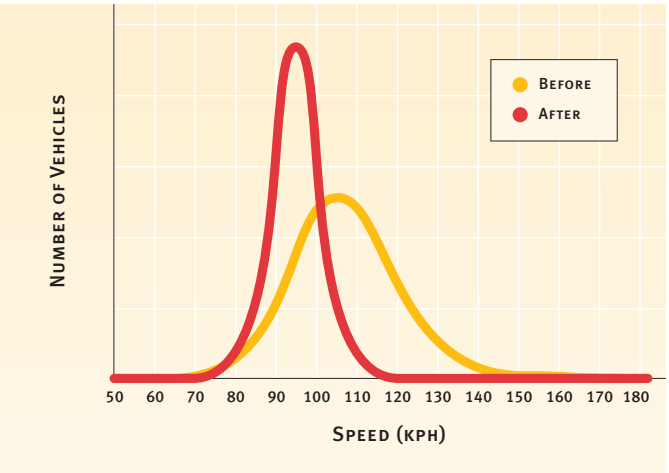


Figure A8 – Changes in both mean speed and speed distribution from a high mean speed and wide speed distribution (before) to a lower mean speed and a slimmer distribution (after)

Note: The figure has been produced for illustrative purposes and does not represent any real data.

1c: The Relationship between a Driver's Speed and Crash History

A third approach to examining the speed-crash relationship has seen researchers measuring a driver's speed in a specific setting and then examining the driver's crash history (both injury and non-injury crashes were studied). Generally, these studies indicate that the higher the driver's speed, the greater the likelihood that the driver had been involved in a previous crash. The largest problem with this approach is the potential bias in the sample due to the exclusion of drivers who were killed in past crashes (Kloeden et al, 1997) or who are no longer able to drive because of injury. In addition, a driver's speeding behaviour may change after a crash. A further bias is that the crash history of drivers is often obtained by self-report.

The first study of this kind was conducted by Munden (1967), who measured the speeds and recorded the registration numbers of vehicles during evening peak traffic flow on rural main roads in England during 1962. The registration numbers of the vehicles were matched to crash records for crashes that occurred in 1961 or 1962. When graphed, a U-shaped curve was found; that is, owners of vehicles travelling one standard deviation above or below the mean speed had an inflated crash rate[21]. The results should be interpreted with caution, however, particularly as there was large variability in the speed ratio (see footnote) and the study relied on small numbers. Also, there is no guarantee that the driver of the car at the time of the study was either the currently registered owner or the same driver as in an earlier crash[22]. Furthermore, Munden cautioned that other factors, such as driver traits, may have caused the elevated crash risk at low and high speeds.

Hauer (1971) provided an interpretation of Munden's findings in terms of the rate of overtaking, although the interpretation can apply only to two-lane, two-way roads. Drivers travelling at slow speeds are overtaken most, hence these drivers may have an inflated crash risk because of |their proximity to the overtaking vehicle (which is travelling at a higher speed). These findings have been interpreted as meaning it is unsafe to travel at slow speeds, but this interpretation ignores the fact that drivers involved in crashes at higher speeds are at greater risk of injury than those driving at lower speeds (see Section 2 for a discussion of the safety implications in requiring slow drivers to speed up and Section 3 for a discussion of the increased injury risk at high speeds). Furthermore, in New Zealand, overtaking crashes represent a small proportion of all speeding crashes, and the vehicle being overtaken is involved in the crash in only approximately half of the cases.

Wilson and Greensmith (1983) used a similar approach to Munden's study; however, driver speeds were measured using a "drivometer", a mechanical device fitted to a car to record speed information. From data on drivers who had had moderate driving experience, the researchers found that those who reported previous crashes recorded higher speeds than those who reported no previous crashes. A similar result was found by West, French, Kemp, and Elander (1993).

21 Owners whose speeds were recorded at least twice were included in the data. Each vehicle's speed was compared to the speed of traffic around it at the same time to give a "speed ratio" for each vehicle (a matched control). The crashes on record were not necessarily on the roads on which the speeds were measured.

22 The car may have been driven by someone other than the registered owner, or the car may have been sold between the time of the earlier crash(es) and the time of the study.

Fildes, Rumbold, and Leening (1991) unobtrusively measured the speeds of vehicles on two urban arterial roads and two rural undivided highways in Melbourne. The vehicles whose speeds were measured were subsequently stopped and their drivers interviewed about, among other things, their crash history over the past five years. Fildes et al found that the self-reported crash involvement rate rose as a function of the measured vehicle speed (see Figure A9). They also found that young drivers tended to be the fastest drivers and to have a high self-reported crash history.

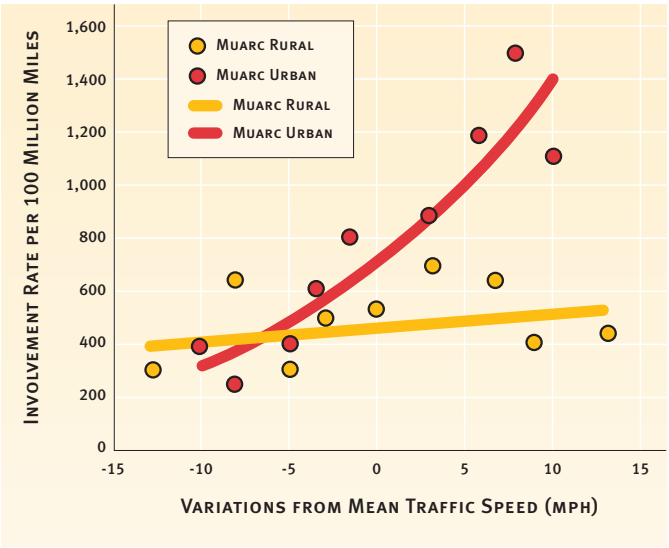


Figure A9 – Involvement rate by variation from the mean traffic speed

Source: Adapted from Fildes et al (1991), with permission.
Note: 15 mph is approximately 24 kph.

Recently, Maycock, Brocklebank, and Hall (1998) measured the speeds of vehicles on 43 sections of single and dual carriageways and motorways in Great Britain, and a questionnaire was sent to the drivers[23]. The measured speeds for individual drivers were compared to their self-reported crash frequencies. In general, drivers with high measured speeds had high crash liabilities.

When crash frequencies for individual drivers were modelled against speed for the drivers, they found that a *"one-percent change in an individual driver's choice of speed is associated with a 13.1% change in that individual's [crash] liability"* (Maycock et al, 1998, p14). They caution, however, that the result does not necessarily mean there is a causal link between speed and crashes. It could be due to *"the fact that both speed and [crashes] are related in similar ways to the same variables – particularly age, experience, and exposure"* (p14).

1d: Principles of Physics

Applying the principles of physics can also demonstrate the relationship between vehicle speed and crash rates. For example, a central factor in the relationship is stopping distance. Stopping distance is affected by vehicle speed, and influences whether or not a crash occurs. There are two components to stopping distance – (1) the distance travelled by the vehicle during the reaction time of the driver and (2) the distance travelled once the brakes are applied. The reaction time of the driver is generally the same regardless of travelling speed; therefore, the greater the speed, the greater the distance travelled during the driver's reaction time. The stopping distance of a vehicle once the brakes are applied is roughly proportional to the square of the pre-braking speed (TRB, 1998), although in reality the formula is much more complicated.

Therefore, because both components of stopping distance increase as vehicle speed increases (and because distance travelled while braking is proportional to the square of the speed, rather than proportional to the absolute speed), total stopping distance increases disproportionately[24] with vehicle speed. The probability of a collision increases similarly, although it also depends on the distance between the vehicle and the hazard when the hazard is first detected. In general, though, the faster the vehicle is travelling when a hazard presents itself, the greater the stopping distance, and the higher the likelihood that the vehicle will collide with the hazard (or another object in attempting to avoid the hazard) before coming to a stop.

Another situation that is affected by speed is the driver's ability to recover from running off the road or to manoeuvre

23 Forty-six percent of the 14,050 questionnaires sent were completed and returned. Seventy-seven percent of the variation in absolute (measured) speeds was due to the site features such as road type. When site-to-site variation was reduced by looking at each site separately (that is, comparing a driver's absolute speed with all other drivers at the same site), they found that the faster drivers were more likely to be young and to drive a high number of miles annually. The number of self-reported crashes during the past three years for drivers who had at least three years' driving experience were also examined. They found that crash frequencies were higher for young drivers and that crash frequencies fell rapidly with more experienced drivers.

24 That is, the relationship is not linear, but follows an upward sloping curve.

to avoid a hazard. Donald and Cairney (1997) provide an example of the distance travelled during the reaction time and recovery time of a driver in a situation where the driver's vehicle runs off the road at one degree (1°) (see Figure A10). If a road has a sealed shoulder 500 mm wide, a vehicle running off the road at this angle would travel 28.5 metres before leaving the sealed surface. A vehicle travelling at 105 kph (29.2 metres per second (m/s)) would cover this distance in just under one second (0.98 s); however, a vehicle travelling at 120 kph (33.3 m/s) would cover the distance in only 0.85 seconds. Research has shown the fastest reaction time of unalerted drivers to be about one second (Triggs, 1981, cited in Donald and Cairney, 1997). Therefore, the driver travelling at 120 kph is unlikely to be able to recover before running off the road. Donald and Cairney note that recovery is much more difficult once vehicles have left the sealed surface, leading to a higher crash risk.

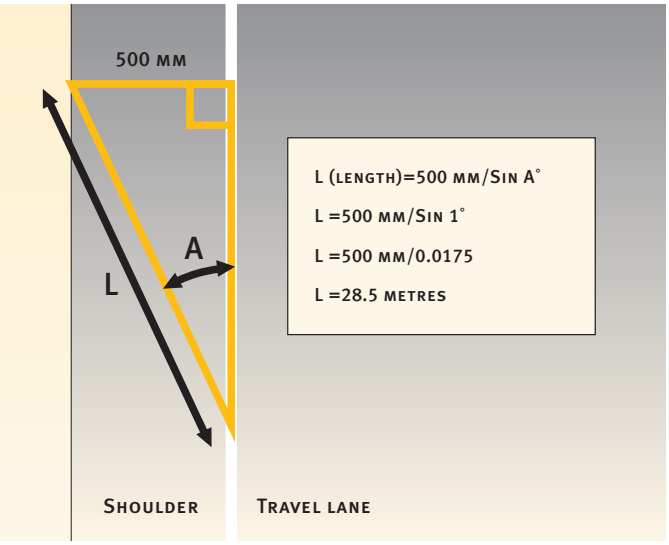


Figure A10 – Run-off-the-road crashes

Source: Donald and Cairney (1997, p24).

Another factor in the relationship between vehicle speed and crash rates is following distance. Because stopping distance increases as speed increases, drivers require a greater distance between their vehicle and the vehicle in front of them when they are travelling at higher speeds. The crash risk for vehicles travelling at high speeds is increased because drivers do not always compensate for their high speed by reducing their following distances (O'Flaherty, 1974). This means that, if the vehicle in front is required to suddenly slow down or stop, there is a high chance of a rear-end crash.

Another factor that increases with vehicle speed is the probability of exceeding the critical speed on a curve. This, combined with the increased braking distance at high speeds, also increases the risk of a crash.

Conclusions

- The research comparing the reported (or measured) pre-crash speeds of vehicles with mean traffic speeds has shown that, in both urban and rural environments, the risk of crashing increases as the pre-crash speed increases above the mean.
- Studies of changes in speed limits have shown that increasing the speed limit leads to increases in crash rates when the speed limit change is accompanied by a mean speed increase. Similarly, decreasing a speed limit can reduce crash rates when the speed limit change is accompanied by a mean speed decrease.
- Researchers have postulated the following relationships:
  - there will be twice as many fatal crashes when the mean speed is 120 kph than when it is 100 kph;
  - for every 1 mph rise in the mean traffic speed, the percentage change in crashes rises by about five percent;
  - a 1-kph reduction in mean speed can produce up to a three percent reduction in crashes.
- Crash risk increases with increasing mean traffic speed. Speed variation also has some effect on crash risk. A slower mean speed is safer than a faster one.
- There is a comparable relative risk for drink-driving crashes and for speeding crashes. A 5 kph increase in speed above 60 kph in a 60-kph zone increases the risk of a casualty crash by about the same amount as an increase in blood alcohol concentration from 0 to 50 mg/100 ml.
- As speed increases, there is an increase in the following factors and, in turn, an associated increase in the risk of crash involvement:
  - stopping distance – both distance travelled during reaction time and distance travelled after brakes are applied;
  - the probability of exceeding the critical speed on a curve;
  - the chance of other road users misjudging how fast the speeding driver is travelling;
  - the probability of a rear-end crash if the driver has not accounted for their increased speed by increasing their following distance.

2: Managing Mean Speed and Variations in Vehicle Speed

The focus of road safety campaigns and enforcement strategies on reducing the mean speed of traffic on our roads is supported by the research findings discussed. However, despite the greater importance to road safety of mean traffic speed, there is some suggestion in the literature that speed variation should also be targeted through enforcement strategies (for example, Lave, 1985, cited in Zaal, 1994). The strategies available for controlling mean traffic speed are discussed at some length in subsequent Parts of this report. In this section, we continue our discussion of how mean speed and speed variation are related, taking up later in more detail some of the matters discussed in relation to enforcement.

Approaches to Managing Variations in Vehicle Speed

If we accept that it is desirable to reduce speed variation, there are two obvious approaches to doing so – encouraging drivers who travel at the slowest end of the speed distribution to increase their speed or encouraging drivers who travel at the fastest end of the speed distribution to decrease their speed. (Another approach is to use both strategies at once.)

It has been argued that some ways of targeting speed variance would not be beneficial for road safety (Zaal, 1994) – encouraging the slowest drivers to speed up is clearly in that category. Such a strategy may actually increase the crash risk of the slow drivers. Slow drivers may choose to travel at a slower speed in the face of probable peer pressure to go faster because they feel less comfortable with travelling faster (Evans, 1991). This in turn is likely to be related to driver or vehicle capabilities or the driver's confidence level. For example, older drivers may slow down to compensate for their reduced vision and visual acuity or to allow for their slower reactions.

Encouraging or forcing slow drivers to speed up beyond their comfort level is contrary to road safety wisdom. Not only is this strategy likely to increase the crash risk of the slowest drivers, but, if these drivers subsequently became involved in a crash, any injuries would be much more severe than if they had travelled at slower speeds (Fildes and Lee, 1993). (This matter will be explored further in Section 3.) Thus, rather than encouraging slow drivers to increase their speed and expose themselves to greater risk, a more beneficial road safety measure would be to encourage them to pull over periodically at safe locations if they hold up traffic.

It is fast drivers, rather than slow drivers, however, who comprise the core safety problem, and encouraging all speeding drivers to slow down would have great benefits for overall road safety. There are no increased risks associated with this approach. One strategy for achieving this aim is to place more emphasis on the drivers who travel at speeds that are excessively above the speed limit than on those who travel at speeds that are moderately above the speed limit. This strategy is already being used worldwide through targeting all speeding drivers and having an increasing penalty rate for increasing speeds – that is, excessive speeders receive higher penalties than moderate speeders.

The overall aim of targeting speeders is to reduce the number of drivers travelling at excess or inappropriate speeds. If successful, this strategy reduces both the mean traffic speed and the degree of variations from the mean speed – that is, the slow drivers do not speed up, but the fast drivers slow down, giving a reduction in the overall distribution of speeds.

Mean Speed and Speed Variation

In contrast to some of the findings discussed in the previous section, studies in New Zealand have demonstrated that, when mean speed is reduced, speed variation also reduces. For example, Frith and Toomath (1982) found that, when the New Zealand open-road speed limit was reduced to 50 mph in December 1973, there was a sharp drop in mean speeds. This drop in mean speeds was accompanied by a sharp contraction in the distribution of these speeds.

Similarly, Keall and Frith (1997) found a significant decrease in the New Zealand national mean speed in urban areas from 1995 to 1996. This reduction was associated with a significant decrease in the spread of speeds at the top end of the distribution; that is, a decrease in the 85th, 90th, and 95th percentiles[25]. In other words, the spread of speeds reduced at the high end of the speed distribution, hence contracting the overall speed distribution (see Figure A11). A similar result was found when mean speeds reduced in the police's Midland region of New Zealand following the introduction of hidden cameras in the area (Keall, Povey, and Frith, 1999 – see Part C for details of the study).

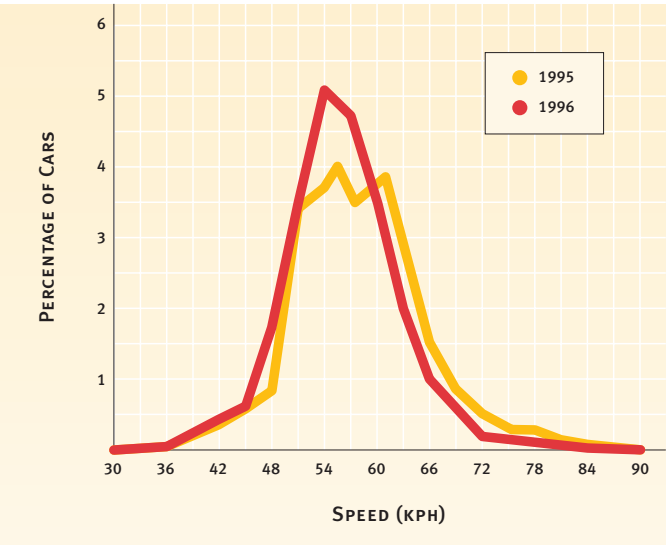


Figure A11 – Estimated distribution of urban speeds, 1995 and 1996

Source: Keall and Frith (1997, p12).

Conversely, increases in mean speed may be associated with increases in speed variation. For example, the National Highway Traffic Safety Administration (NHTSA, 1992, cited in TRB, 1998) examined the speed distribution between 1986 and 1990 on rural interstate highways in the 18 USA states that raised their speed limit when the National Maximum Speed Limit (NMSL) increased from 55 to 65 mph. They found that, following the speed limit change, there was an increase in mean speeds. This increase in mean speeds was accompanied by a wider speed distribution. This came about because some of the fastest drivers increased their travel speeds, hence extending the top end of the distribution, while many of the drivers at the slow end of the distribution did not change their speeds (see Figure A12 below).

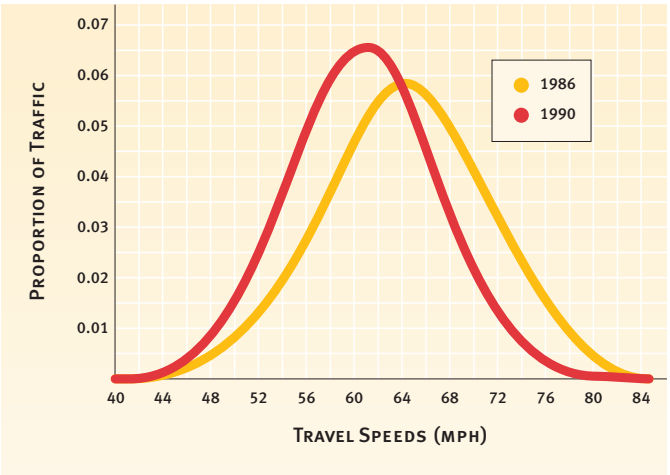


Figure A12 – Estimated changes in the distribution of rural interstate highway travel speeds between the fourth quarter of 1986 and the fourth quarter of 1990 in the 18 states that raised speed limits in 1987

Source: NHTSA (1992, cited from TRB, 1998, p117).

These studies demonstrate that mean speed and speed variation are highly correlated. Therefore, care needs to be taken when considering which is of greater importance in improving road safety.

It should be noted that the results above all relate to normal speed distributions. When the distribution is not normal, a different result may emerge. Urban areas often have non-normal distributions, especially at peak times, because of congestion; therefore, reducing the mean speed in such situations may have quite a different effect on the speed variation (Lynam et al, 1999).

25 The 85th percentile decreased from 65.5 to 63.5 kph, the 90th from 67.5 to 65.5 kph, and the 95th from 71 to 69 kph.

Conclusions

- Slowing the speed of drivers travelling at excess or inappropriate speeds will tend to reduce the mean speed of traffic as well as reduce the number of drivers at the top end of the speed distribution.
- Encouraging slow drivers to speed up would lead to more crashes and injuries. Slow drivers could instead be encouraged to pull over at safe locations if they hold up traffic.
- Fast drivers rather than slow drivers comprise the core safety problem, and encouraging all speeding drivers to slow down would have greater benefits for overall road safety than targeting the speed of slower drivers.

3: The Impact on the Human Body of Different Crash Speeds

In the discussions so far in this Part, we have seen that increased speed increases crash risk. Crashes place intense physical pressure on the human body, whether that body is an occupant in a crashed vehicle or is another road user such as a pedestrian. The human body usually has no capacity to cushion the effects of a crash once it occurs, and so is left to the mercy of the physical forces that are at play to determine the severity of the resulting injury.

As we shall see later on, excess and inappropriate speed is recorded as contributing to a large number of road crashes in New Zealand. This has been assessed in terms of reduced stopping distances, the driver exceeding the critical speed on a curve, the loss of friction between the vehicle's tyres and the road, and the reduced capacity of the driver to detect and respond to hazards. But this is only one part of the speed story.

For every crash where speed is an identifiable factor in contributing to the crash, there are many other crashes where speed may not be identified as a direct crash factor, but where it is a direct injury factor. This distinction between speed as a crash factor and speed as an injury factor is fundamental to our understanding of the critical role that speed plays in the toll of injury and death on our roads.

In general, as driving speed increases, so does the impact speed of a vehicle in a collision (TRB, 1998). Similarly, the higher the speed at which a vehicle crashes, the more severe the injuries for the vehicle occupants and for other persons affected by the collision. For example, the Peugeot-Renault biomechanics laboratory conducted a study of injuries sustained in crashes by 100,000 occupants of small cars fitted with seatbelts. They found that at speeds up to 35 kph there were practically no fatalities. However, at speeds of 70 kph almost 50% of the occupants were killed (European Conference of Ministers of Transport (ECMT), 1996).

The Severity of Injuries to Vehicle Occupants

Evans (1991) provides a detailed description of what happens to vehicle occupants during a collision:

"When a vehicle crashes, it undergoes a rapid change in speed. Occupants continue to move at the vehicle's previous speed until stopped, either by impact with objects external to the vehicle if ejected, by striking the interior of the vehicle, or by being restrained in some other way (through, for example, airbags or seatbelts)" (p247).

The rapid change in speed that a vehicle undergoes in a crash is known as "Delta-V" and is an important measure of crash severity (TRB, 1998).

The injury severity to occupants in a crash increases non-linearly with impact speed, because of the relationship between the energy released in the crash and the speed of the vehicle. In the first section to this Part, we referred to the formula for kinetic energy – that is, $\frac{1}{2} \times \text{mass} \times (\text{speed})^2$. Fildes and Lee (1994) illustrate how this formula relates to the crash situation – *"a 20% increase in speed will, for example, result in a 44% increase in kinetic energy to be dissipated"* (p10).

Also, as the TRB (1998) stated, *"The greater the speed at which occupants must absorb the energy released by the vehicle at impact, the greater the probability and severity of injury"* (p63).

Several studies have been conducted on injury severity with differing Delta-V or impact speed[26]. For example, O'Day and Flora (1982, cited in TRB, 1998) conducted an intensive investigation of approximately 10,000 crashes that occurred between 1977 and 1979. The probability of a fatality increased dramatically with impact speed. For example, a driver crashing with an impact speed of 80 kph was twice as likely to be killed as one crashing with an impact speed of 64 kph. *"At impact speeds above 50 mph [80 kph], the probability of death exceeded 50%"* (TRB, 1998, p64).

Joksch (1993) examined crashes of all severity levels between 1980 and 1986 from the National Analysis Sampling System (NASS) database[27] in the USA. He found that the probability of a fatality is related (approximately) to the fourth power of Delta-V (see Figure A13).

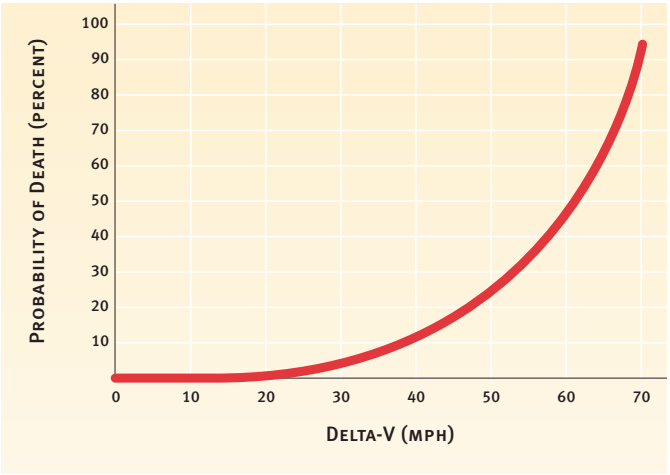


Figure A13 – Fatality risk for car drivers in relation to Delta-V

Source: Data for figure generated using Joksch's (1993) formula: $(\text{Delta-V}/71)^4$.

Bowie and Walz (1994, cited in TRB, 1998) also used the NASS data, this time from 1982 to 1989, as well as the Abbreviated Injury Scale (AIS), which rates injury severity levels from 1 (minor injury) to 6 (injury not currently survivable). They found a dramatic increase in injury severity as Delta-V increased.

The risk of injury for older people involved in collisions is generally a lot higher than the risk for younger people, because of their greater frailty. For example, analyses by Wouters (1989, cited in Maycock, 1997) and Evans (1991) on the vulnerability of vehicle occupants indicate that a male driver aged between 70 and 80 would be three times more likely to be killed in a crash than would a 20-year-old male (for women in this age group, the risk is approximately 20% higher than for the men). Evans obtained this relationship by examining fatal injuries of drivers from crashes of similar severity – that is, he examined crashes with the same physical impact and determined the fatality risk for all driver ages relative to age 20.

Evans (1991) also examined the fatality risk for all male car occupants and motorcycle riders relative to age 20. From his analysis, he generated a formula of the fatality risk from similar physical (crash-related) assaults relative to age 20 (see Figure A14).

26 Note that the results of these studies depend on the use of restraints (particularly seatbelts). Since these studies were conducted in the USA where the rate of restraint use is low, the risk may be over-estimated for New Zealand, which has a relatively high restraint wearing rate.

27 The NASS database contains data on inspections of crashed vehicles in the USA.

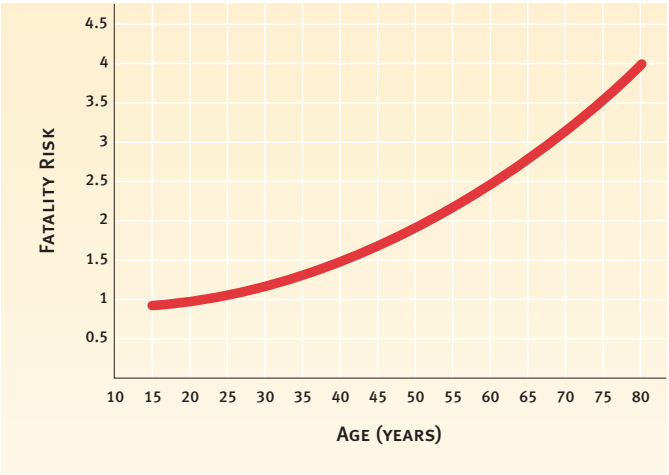


Figure A14 – Fatality risk for similar physical (crash-related) assaults for males of different ages relative to the risk for 20-year-old males

Source: Data for figure generated from formula in Evans (1991, p26).

Figure A15 – The influence of the collision speed on the probability of death of a pedestrian

Source: Data for the figure generated using Ashton's 1982 formula (cited in Pasanen and Salmivaara, 1993).

The Severity of Injuries to Pedestrians

The severity of injuries to vehicle occupants is clearly related to the impact speed of the vehicle, although the injuries are lessened by vehicle factors, such as energy-absorbing characteristics and mass and also by the restraints on the vehicle occupants. The severity of the injury sustained by a pedestrian hit by a vehicle is also related to the impact speed. However, pedestrians do not have any protection factors to absorb the energy of the collision. Therefore, an impact speed that may injure a vehicle occupant will kill a pedestrian. For example, a formula was developed from a case study by Ashton (1982, cited in Pasanen and Salmivaara, 1993, p308) on the risk of death to pedestrians hit by a vehicle. Figure A15 plots the formula for speeds between 0 and 100 kph.

As can be seen from Figure A15, the risk of death for a pedestrian hit by a vehicle increases dramatically at collision speeds from 40 to 60 kph. Similar findings have been reported elsewhere in the literature. For example, the European Transport Safety Council (ETSC, 1995) reviewed several studies of pedestrian-vehicle crashes. They concluded that the probability of death for a pedestrian is five percent if hit by a vehicle travelling at 32 kph, 45% if hit by a vehicle travelling at 48 kph, and 85% if hit by a vehicle travelling at 64 kph.

The risks of killing weaker members of the population, such as the elderly, are even higher. Similarly, young children are particularly vulnerable to injury in a pedestrian-car collision because of their small stature – that is, their heads are more likely to be hit directly by the rigid front of the car. Once children are tall enough that their heads are clear of the landing edge of the bonnet, the risk is much reduced.

Evidence of the increased risk for the elderly was demonstrated by Glaeser (1993, cited in McLean, Anderson, Farmer, Lee, and Brooks, 1994). Glaeser examined 522 cases in which a pedestrian was struck by the front of a passenger car. The pedestrian's head injuries were given an Abbreviated Injury Score (AIS) rating[28]. Glaeser found that high AIS ratings for head injuries occurred at impact speeds above

28 AIS assesses severity of injury in relation to probability of death: 1 = minor, 2 = moderate, 3 = serious, 4 = severe, 5 critical, and 6 = maximum.

30 kph, and that these high ratings are very frequent at speeds over 50 kph, especially among elderly pedestrians.

Further evidence of the effect of speed on all pedestrian injuries has been demonstrated in a study by Walz et al (1983, cited in McLean et al, 1994). They investigated the reduction in the Zurich urban speed limit, from 60 to 50 kph, and found that the number of pedestrian-vehicle collisions in the first year after the change fell by 16%, resulting in a 25% decrease in pedestrian fatalities. The Injury Severity Score (ISS)[29] of the pedestrians involved in the collisions also decreased. Furthermore, fractures to the pelvis and ribs of the pedestrians were reduced by 50%.

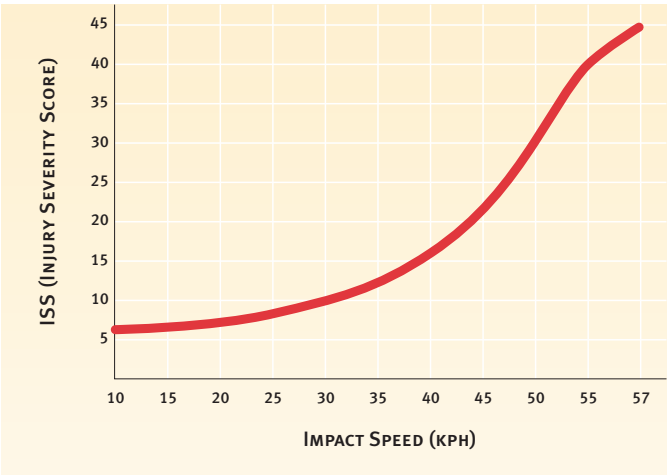


Figure A16 – Impact speed and injury severity (ISS)

Source: Walz et al (1993, cited in McLean et al, 1994, p8).

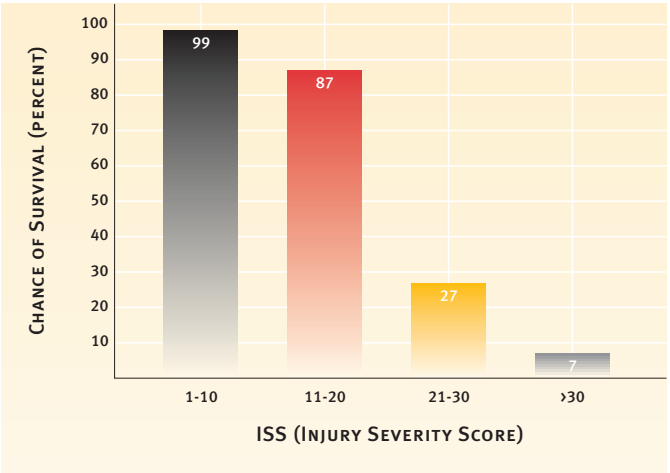


Figure A17 – Probability of survival as a function of ISS

Source: Walz et al (1993, cited in McLean et al, 1994, p9).

Walz et al (1993, cited in McLean et al, 1994) also compared the distribution of impact speeds in their data with the distributions from five other studies. The potential pedestrian injury severity was then related to the impact speed of the vehicle (see Figure A16). The probability of survival for a given ISS was then estimated from 952 cases (see Figure A17).

The Combination of Collision Risk and Injury Severity to Pedestrians

It is important to note that reducing the travel speed of vehicles in an area, through such measures as reducing a speed limit with associated enforcement, can have two effects for pedestrians. It can reduce the chances of a collision between a vehicle and a pedestrian and it can reduce the severity of injuries to the pedestrian should such a collision occur. That is, at a slower speed, a driver has a greater chance of being able to stop under emergency braking and avoid colliding with a pedestrian in his or her view. Furthermore, if the vehicle is travelling at a slower speed, the pedestrian has a greater chance of seeing the approaching vehicle in time to move to avoid the collision. Even if the driver and pedestrian are unable to avoid the impending collision, at a slower speed the impact is less; hence the pedestrian receives less severe injuries than if hit at a higher speed.

McLean et al (1994) determined the relationship between initial speed and stopping distance from an examination of 176 fatal pedestrian collisions in the Adelaide area between 1983 and 1991. (This study is discussed in more detail in Part C.) Using the analysis of these fatal collisions, the researchers determined what effect a reduction in vehicle travelling speeds would have on the incidence of fatal pedestrian-vehicle collisions in the Adelaide area. Several speed reduction scenarios were considered. For example, in the scenario of a uniform speed reduction of 10 kph in 60-kph speed limit zones, McLean et al predicted that the incidence of fatal pedestrian-vehicle collisions would reduce by 48%. Furthermore, in this scenario, 22% of the pedestrian-vehicle collision cases would have been avoided altogether. Hence, small reductions in speed can lead to large safety benefits for pedestrians as well as for other road users.

29 ISS is the sum of the square of the highest AIS score for each of the three most severely injured body regions.

Conclusions

- The research into the relationship between vehicle speed and injury severity has consistently shown that, as a vehicle's speed increases, its impact speed in a crash increases, which in turn dramatically increases the severity of the resulting injury.
- If the crash involves a pedestrian, the probability of death for the pedestrian also increases dramatically with impact speed. However, the risk of death for pedestrians involved in a collision is greater at lower speeds than the risk for vehicle occupants. Also young and older pedestrians are at greatest risk of injury if involved in a pedestrian-vehicle crash.
- The probability of death for a vehicle occupant is related to the fourth power of Delta-V (the rapid change in speed that a vehicle undergoes in a crash).
- The severity of an injury for vehicle occupants increases dramatically as Delta-V increases.
- The risk of death to a pedestrian increases dramatically from an impact speed of 40 to 60 kph.

Part B

Countermeasures: Vehicle and Road Design

We know that increased vehicle speed increases the risk of crashing and the severity of injuries arising from those crashes – we discussed these issues in Part A. We know also that increased mean traffic speed increases the number of minor, serious, and fatal injuries on the road. With this information, we need to begin assessing how we can control – and reduce – speed. A significant barrier to reducing speed is the increasing performance and speed capacity that is being built into the traffic system. This Part addresses design and engineering matters that are relevant to the speed problem, in relation to both the roads that provide the foundation of the traffic system and the vehicles that drive on those roads.

Design and engineering play a fundamental role in the safety of our traffic system, in terms of both the physical and performance characteristics of roads and vehicles and drivers' responses to these characteristics in terms of their perceptions of danger. New vehicle design, for example, often seeks increased mechanical performance in terms of both power and speed, and increased consumer comfort, even though some "enhancements" may negatively impact on the safety of road users. (For example, if a driver chooses to travel at a higher speed due to the increased comfort at high speeds in new vehicles, then his or her crash risk is increased and the severity of injuries sustained in a crash is increased.) And yet, vehicle safety standards have been instrumental over the last 20 years in saving lives and in reducing the severity of injuries suffered by vehicle occupants when crashes occur.

New road design can have a similar effect. In terms of physical capacity, new road building generally allows for increased capacity and mobility. This can reduce driver perceptions of danger in the roading environment and increase speed. However, improved roading design and traffic engineering provide a significant means to reduce speed (particularly in urban areas), reducing crashes, deaths, and injuries.

Better road design can also reduce the chances of a crash at any speed. However, this may be outweighed if the better road design increases the number of vehicles travelling at high speeds. That is, despite the better road design, vehicles travelling at high speeds have a high crash risk. Furthermore, if a vehicle travelling at high speeds is involved in a collision, the occupants are likely to receive more severe injuries than occupants involved in crashes at lower speeds.

In the context of a safety discussion about the impact of speed, therefore, design and engineering are seen as a two-edged sword – a pivotal part of the speed equation. On one side, improved mechanical or physical properties improve the ease with which road users move on the roading network. On the other side, increasing the ease of use might reduce the perceptions of real danger in the use of the network. This discussion of design and engineering issues focuses on the role that vehicles and roads play in driver speed behaviour and on measures to improve that behaviour.

1: Vehicle Design

Motor vehicles provide an exceptionally high level of mobility, primarily because of the speed at which they can move at any one time. That development and that mobility has, of course, also come at an exceptionally high cost in human life, and a primary factor in the human cost is the speed at which these vehicles travel.

Vehicle Design and the Risk of Injury

It is important to recognise firstly the considerable progress that has been made in reducing the risk of injury through vehicle design. This is illustrated by Figure B1 below, which shows the increasing crashworthiness[30] of the Australian vehicle fleet over the last 30 years, and maps this against the introduction of Australian Design Rules (ADR).

New vehicle design is continuing to decrease the number and/or degree of injuries sustained in a crash (through secondary prevention measures). However, new vehicle design has not focused a great deal on decreasing the chances of a crash (that is, through primary prevention measures) and, even when it has, the measure has not been shown to be completely effective. For example, the anti-lock braking system (ABS) was designed to decrease the chances of a crash through more effective braking (Evans, 1991). Unfortunately, ABS does not appear to have been effective at reducing the incidence of crashes as much as its advantages over vehicles fitted with non-ABS brakes would predict (Evans, 1991; Highway Loss Data Institute in the USA, 1994, cited in Várhelyi, 1996). Behavioural changes by drivers with ABS brakes are the suggested reason for their weakened effectiveness. For example, drivers driving on ice and snow in vehicles equipped with ABS took risks that were greater than the advantages ABS gave (Biehl, Aschenbrenner, and Wurm, 1987, cited in Evans, 1991). Similarly, Aschenbrenner et al (1992, 1993, cited in Várhelyi, 1996) found that drivers with ABS-equipped cars drove with smaller safety margins than drivers of cars without ABS. Furthermore, the effectiveness of ABS brakes differs depending on whether or not the road is sealed. On an unsealed road, ABS brakes lead to a longer stopping distance than other types of brakes. Despite the less than expected benefit of ABS brakes for vehicle occupants, ABS brakes are likely to provide safety benefits for road users outside the vehicle, such as pedestrians and cyclists. For example, a driver with ABS brakes may be able to stop the vehicle sooner than a driver without ABS brakes when encountering a pedestrian in his or her path.

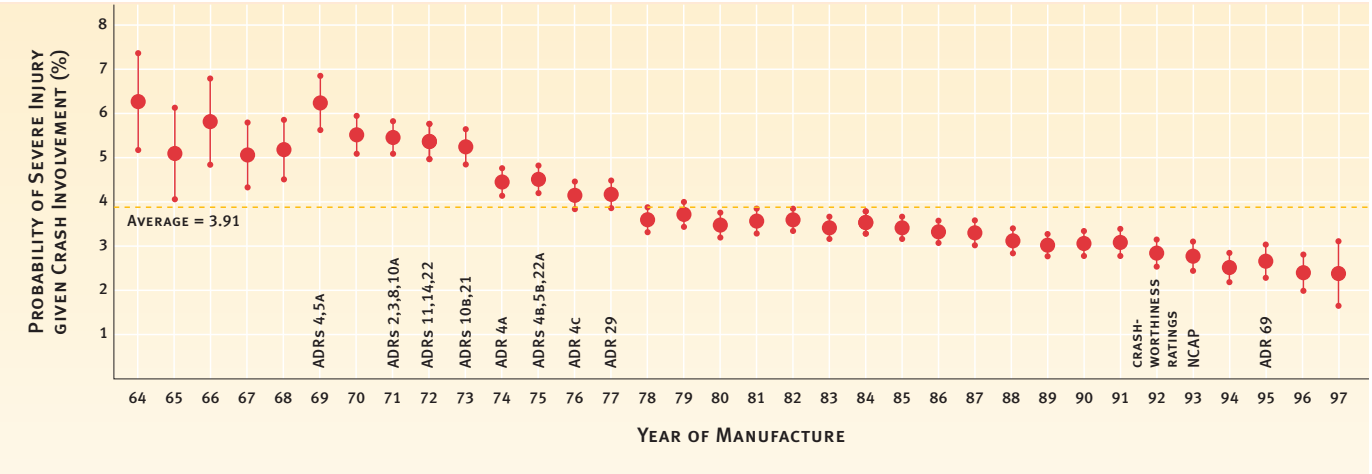


Figure B1 – Crashworthiness of vehicles by year of manufacture

Source: Newstead and Cameron (1999). Graph courtesy of Monash University Accident Research Centre.

30 A vehicle's crashworthiness is its ability to protect its occupants from serious injury given crash involvement.

In terms of secondary prevention, there are two types of occupant protection devices designed to prevent injury should a crash occur – active devices, which require the user to perform a specific act (such as put on their safety belt), and passive devices (such as airbags), which protect the user without requiring the user to perform an action. As discussed in Part A, during a collision a vehicle undergoes a rapid change in speed, known as Delta-V, and unrestrained vehicle occupants will continue to travel at the speed the vehicle was travelling before the collision. Safety belts, used in tandem with airbags, decelerate the occupant to either avoid or minimise the occupant's impact with the vehicle's interior. As well as reducing the likelihood and severity of injuries to users, safety belts have the major benefit of reducing the chance that the occupants will be thrown from the vehicle (where they would travel close to the pre-crash speed until striking something in the environment).

Passive occupant protection devices in use that continue to be improved include side impact protection, frontal crash protection, offset front crash protection, padded head impact areas, improved safety belt systems, and "intelligent" airbags that adjust deployment rate to crash severity and restraint status of occupants. All of these are designed to reduce the injury severity of occupants involved in crashes by reducing the immediate impact on the occupant.

Design attention has also turned to vehicles that are "pedestrian friendly". Pedestrian-friendly vehicles are designed – with sloping fronts, for instance – to reduce the injuries to a pedestrian involved in a pedestrian-vehicle collision. Once a collision occurs, the main aggravator of pedestrian injuries is the impact on the human body by parts of the vehicle that are too stiff. In some cases, the skin of the vehicle may be soft enough in itself, but to protect the pedestrian there also needs to be a crush space underneath the skin of the vehicle; for example, between the bonnet and stiff engine components. Pedestrian-friendly vehicles are also designed to be free of sharp and protruding objects.

Vehicle Design and its Impact on Speed

Despite such improvements to vehicle design, particularly in relation to the protection and comfort of vehicle occupants, vehicle speed will always be the central factor in injury risk to road users, whether they are motor vehicle occupants, pedestrians, cyclists, or motorcyclists.

It has been argued that recent developments in vehicle design are insulating vehicle drivers from the perception of danger when speeding, and influencing speeding behaviour. For example, physical cues about speed such as the noise and vibration of the road and the tilting motion on sharp curves that were more obvious in older vehicles are muted by improved vehicle handling, high-performance tyres, and air-conditioning systems in modern vehicles (Comte et al, 1997, cited in TRB, 1998). The sound of the air stream passing over and around the moving vehicle is also reduced by improved seals on windows and doors, while improvements in the quality and performance of car stereo systems can also effectively mask auditory cues about speed. As well, drivers report that, with more comfort, the sensation of speeding is reduced, leading to subconscious speeding (Nilsson, 1986, cited in Várhelyi, 1996). Evidence for this was provided more recently by Horswill and McKenna (1996). They found that drivers on a driving simulator drove faster when the volume control regulating engine and traffic noise on the simulator was turned down than when the volume was set at its normal level; however, the drivers were unaware that the simulator volume was lowered.

While driver perception of speed may be affected by these comfort factors, the European Conference of Ministers of Transport (ECMT) concluded that performance remained the main objective of new design for vehicle manufacturers (ECMT, 1996). Vehicles are designed to travel much faster than the speed limit, and the newer the vehicle, the greater the performance. Fildes, Rumbold, and Leening (1991) found that drivers of newer vehicles travel faster than drivers of older vehicles. In both urban and rural environments, drivers of vehicles less than four years old were more likely to exceed the speed limit and travel at excessive speeds than drivers of older vehicles. More recently, Fitzgerald, Harrison, Pronk, and Fildes (1998) found that large, relatively new vehicles not owned by the driver tended to be driven at high speeds. Furthermore, the greater the performance of the vehicle in terms of engine size, the higher the speed. Quimby, Maycock, Palmer, and Butress (1999) found that drivers of a car with an engine size of 2,000 cc (cubic centimetres) drove four percent faster than drivers of a car with an engine size of less than 1,000 cc.

Future Vehicle Design

In terms of primary prevention, new perception-based technologies can help to reduce the speed at which drivers choose to travel. For example, devices such as "heads-up display speedometers", which display the vehicle's current speed in the driver's normal field of vision rather than on the dashboard, are designed to make it easier for drivers to monitor their speed, although their safety value is questionable, as it is unknown whether the devices negatively affect the driving task (Comte et al, 1997, cited in TRB, 1998). Other devices are designed to detect hazardous situations and warn drivers to adjust their speed. For example, systems have been designed that warn drivers when they get too close to the vehicle in front given their current speed or when a sharp curve is approaching and a reduction in speed is needed (TRB, 1998). Recent global positioning technology can help drivers who unintentionally exceed the speed limit by telling drivers where they are and what the speed limit is in that area.

More sophisticated technology is also addressing physical separation of vehicles in order to reduce crashes. These new technologies include advanced cruise-control systems, which maintain safe following distances, and "smart cards", which determine maximum driving speeds based on the user of the car (TRB, 1998). Such technologies do not address the more fundamental problem of how fast vehicles are designed to travel.

The most direct means of reducing vehicle speed and crash risk appears to be speed limiters, which limit the top speed of the vehicle to a predefined value regardless of the user. Several field and simulation studies have been conducted to examine the effectiveness and acceptability of speed limiters in Europe. For example, Várhelyi and Mäkinen (1998) conducted a study in which drivers drove a car equipped with a speed limiter around a pre-defined route in one of three European cities[31]. Driving behaviour in the vehicle fitted with the speed limiter was compared to driving behaviour over the same route in a vehicle without a speed limiter. Várhelyi and Mäkinen found that the speed limiter reduced speeds, particularly in free driving conditions (that is, when unimpeded by other vehicles). The speed limiter also decreased individual speed variation and led to smoother approach speeds at roundabouts, intersections, and curves. Hence, as well as reducing speeds, speed limiters have the potential to make traffic flow smoother. The drivers were also asked their opinions on speed limiters before and after the two test drives. The drivers tended to show increased acceptance towards using a speed limiter after having driven with one. A frequent comment from the drivers was that the speed limiter would be "useful" or "ideal" if all vehicles were equipped with one, presumably because there would be less pressure from other traffic to travel above the speed limit. The results of this study and others on speed limiters indicate that they are likely to be effective in built-up areas. However, further research is needed in rural conditions.

These mechanical limitations on speed are in use on heavy vehicles in Australia. However, the use of speed limiters within a national vehicle fleet has not yet been implemented anywhere. This seems to be because car manufacturers are not generally supplying speed limiters as a safety feature, new car consumers are not demanding speed limiters as a safety feature, and governments are not regulating their use except in relation to heavy vehicles. Speed reduction mechanisms in themselves do not appear to be a desirable safety feature in new vehicles.

Conclusions

- Significant progress has been made in vehicle design to reduce the injury impact on vehicle occupants.
- In terms of reducing the effect of vehicle speed, vehicle safety design has concentrated on secondary rather than primary injury prevention. That is, greater emphasis has been placed on design features that reduce the severity of the injury, rather than on features that reduce the incidence of crashes that lead to the injury.
- Specifically, recent vehicle design has:
  - tended to insulate the driver of the vehicle from the perception of danger when speeding, thereby facilitating an increase in driving speeds;
  - improved vehicle performance, thereby facilitating increased driving speed.
- European studies have shown that direct speed reduction, through mechanisms such as speed limiters, is likely to be effective in reducing speeds.

31 The speed limiter was automatically triggered by transmitters attached to speed-limit signs. Thus, the speed the vehicle was limited to depended on the speed limit.

2: Roading Factors and their Impact on Speed

Vehicle safety improvements take time to work through vehicle fleets and impact in a significant way on the level of injury and death on the road, often taking between 10 and 20 years to have an effect. Changes in public attitudes can take even longer to produce a substantial gain in road safety. By comparison, safety improvements to the roading environment can take place in a matter of weeks and months, rather than years. Indeed, the most crucial factors appear to lie in diagnosing the road or traffic factor that may be affecting safety on a piece of road, and developing an appropriate solution that improves safety and does not simply shift the safety problem from one point to another or replace one safety problem with another. This section outlines the roading techniques that can be used to improve safety, and reports on evaluations of those techniques[32].

2a: The Impact of the Environment on Speed and Perceptions of Safety

As we shall see, psychology plays a part in much of the following discussion on the use of road and traffic design to reduce speed. Before progressing further, therefore, we should recognise that a driver's choice of travel speed is dependent on both sensory perception and cognitive processing. Sensory perception determines what information is available to the driver, while cognitive processing determines what the driver will do with the incoming information. Therefore, the environment the driver travels in is a very important factor in determining his or her choice of speed. In particular, as we shall see, a driver makes a judgement about the relative "safety" of a stretch of road based on his or her perception of the roading environment. Generally, where drivers perceive a stretch of road to be "safe", travel speeds tend to be higher. Below, we discuss environment and road factors that influence perception and, hence, speed choice.

Roadside Developments

In general, more extensive roadside development tends to reduce speed, and drivers travelling on roads through open farmland could be expected to drive faster than they would through a built-up urban area. Roadside development is a critical factor in the development of speed limits, and speed limits tend to be lower on urban than on rural roads, a factor that in itself influences (or even reinforces) drivers' speed choice. Overall, rural roads tend to have higher speeds, lower traffic volumes, and higher crash severity than urban roads (Hungerford and Rockwell, 1980; Jennings and Demetsky, 1983). The design of the two different road types also has a major effect on speed perception.

Fildes and Lee (1993) define roadside development as *"any aspect of the environment close enough to the roadway to influence driving"* (p59), whether on four-lane highways or on urban roads. Houses set close to the road in urban environments have been found to reduce speed, and trees on the side of rural roads have been found to influence the perception of speed and safety. For example, Fildes, Fletcher, and Corrigan (1987) found that roads without roadside trees were perceived to be safer and travel speeds were underestimated much more than was the case for roads that had a large number of roadside trees. However, this perceptual effect disappeared in semi-rural environments.

Two studies have analysed the perception of safety on curves with different roadside developments. Fildes, Leening, and Corrigan (1989) reported that speeds for curves that had a small radius, that were walled, or that had a gravel surface were judged to be more unsafe than the same speeds on curves without these features. Vaniotou (1990) found that bends with immediate surroundings that contained any or a combination of safety rails, fences and walls, vegetation, poles, overhead cables, or reflective posts gave different perceptions of safety to bends with essentially similar bend geometry but without the immediate surroundings material or with a different combination of surroundings material (although which combinations gave the greatest perceptions of safety was not reported in Fildes and Lee, 1993). These differences in

32 Fildes and Lee (1993, chapter 5) provide an excellent summary of the influence of the environment and road on speed perception and related speeding behaviour. The following is an outline of their review with, wherever available, the inclusion of more recent literature. Unless otherwise indicated, all references prior to 1993 are cited from Fildes and Lee (1993).

perceptions of safety are broadly in line with the real levels of safety in the different environments.

Physical Attributes of the Road

The physical attributes of the road have also been shown to have an effect on speed. These attributes are outlined below, but they all relate to the overall standard of the road, and ultimately to design speed. In general, the higher the road standard, the greater the proportion of drivers who exceed the speed limit. For example, Grime (1987, cited in Várhelyi, 1996) found that the proportion of drivers exceeding the speed limit was five percent on two-lane roads with a speed limit of 60 mph (97 kph), 12% on dual carriageways with a speed limit of 70 mph (113 kph), and 40% on motorways with a speed limit of 70 mph (113 kph) (see also O'Cinnéide and Murphy, 1994, cited in Várhelyi, 1996). A driver's perception of safe speeds is also influenced by the category of the road. For example, Fildes et al (1989) found that high speeds on median-divided roads were judged safer than high speeds on two-lane, undivided, two-way roads.

Several studies have found a relationship between vehicle speed and road width. For example, Vey and Ferrari (1968) found that speeds on 3.4 metre lanes on a bridge in Philadelphia were higher than speeds on 3.0 metre lanes on a comparable bridge. Nilsson (1989, cited in Várhelyi, 1996) reported that, for each metre increase of paved road width, speeds increased by 0.4 kph.

Although road markings are generally used to define lane width, several studies have examined the effects of different variations of markings on vehicle speed. Edge lines on curves have been shown to keep vehicle speeds on curves appropriate. For example, Witt and Hoyos (1976) found that drivers in a simulator adopted a more suitable speed profile while negotiating a curve where edge lines were varied, rather than being in a uniform configuration. Varying edge lines on straight sections of road do not appear to affect vehicle speeds, however (Lum, 1984; Cottrell, 1985); edge lines on straight sections of road are more useful for guidance within the lane (Triggs and Wisom, 1979; Triggs, 1986). In terms of guiding vehicles along the road, a study in Finland discovered that reflector posts designed to assist guidance during darkness increased vehicle speeds on two-lane rural roads (Kallberg, 1993, cited in Várhelyi, 1996). For example, *"reflector posts on roads with an 80-kph speed limit and relatively low geometric standard increased driving speeds in darkness by up to 10 kph"* (Várhelyi, 1996, p10).

Also relevant in this context is road geometry. Road geometry refers to the bends and curves ("horizontal curvature") and the hills and raised sections ("vertical curvature") of a road. Speeds on curves appear to be dependent on how the driver perceives a curve before entering it. For example, Milosevic and Milic (1990) found that drivers underestimated their speeds on curves. However, drivers' estimations were more accurate if they had seen warning and speed limit signs. Matthews and Barnes (1988, cited in Matthews, 1988) found that a high proportion of night-time crashes in New Zealand occur on curves on rural roads, particularly on curves with a short radius (that is, sharp corners) in isolated areas. Matthews (1988) suggested these crashes were due to drivers failing *"to perceive the curve or the particular demands of the curve"* (p276) and not adjusting their speed accordingly. Matthews (1988) conducted a study that examined the effect of placing a red flashing chevron before a curve to alert the driver to the presence of the curve. He found that *"the speeds of vehicles entering curves were substantially reduced by supplementing the standard advisory signs and chevrons with a red flashing chevron"* (p286).

Regarding "vertical curvature", researchers have found an over-representation of crashes on graded sections of road compared to flat sections (Agent and Deen, 1975; Cooper, 1980). However, there is an under-representation of crashes at curve crests. Cooper (1980) suggested the result is due to vehicle speeds increasing on the downgrade, which may lead to the driver losing control. Wright and Zador (1981) and Hall and Zador (1981) reported an increased risk of single-vehicle fatal roll-over crashes on downhill slopes than on level or uphill sections. Speeds are likely to be less on curve crests because of a restricted sight distance (that is, the driver does not know what is over the curve crest).

Several studies have examined the relationship between sight distance and vehicle speed. Some have shown no relationship (for example, Yagar and van Aerde, 1983, cited in Várhelyi, 1996), while others have found that sight distance restrictions induce a small reduction in speeds, although only for the faster travelling drivers. However, a recent study by Hogema and van der Horst (1994, cited in Várhelyi, 1996) on a two-lane motorway in the Netherlands has shown clear reductions in vehicle speed depending on visibility range (that is, depending on whether fog or bad weather was present). Compared to clear visibility (defined as visibility of over 1,000 metres), when the visibility range was 300 metres, free-driving speeds reduced by about five

percent in the left lane of the motorway and by eight percent in the right lane. Speeds remained relatively constant when visibility was between 140 and 300 metres. When visibility reduced to less than 100 metres, speeds dropped drastically. However, the researchers reported that, when visibility ranged from 40 to 120 metres, *"even in an extreme case of hard braking…, the speeds of the free driving vehicles… were too high to avoid a collision if suddenly confronted with a stationary obstacle"* (p13). Fildes and Lee (1993) reported that *"it is difficult to separate the effects of gradient [or curvature] alone from sight distance in the speed literature"* (p65), as the horizontal and vertical curvature of a road are primary causes of sight distance restrictions.

Finally, the smoothness of the road surface also appears to be directly related to vehicle speed (for example, Oppenlander, 1966; McLean, 1982). Anund (1992, cited in Várhelyi, 1996) measured the roughness of the road surface using the International Roughness Index (IRI). As IRI increased for a road, the mean speed of passenger cars travelling on the road decreased, although no difference in speed was detected for trucks. These findings are likely to be partly due to the higher noise level (caused by friction between the tyres and the road) as roughness increases.

All of the above physical attributes affect the standard of the road, and the overall standard of the road is itself related to the design speed of the road (that is, the travel speed that the road has been designed for). The design speed is based on factors such as curvature and sight distance.

Traffic Factors

Beyond the physical attributes of the road, other traffic related factors can also influence vehicle speed. In general, as traffic volume and density increases, travel speed decreases (Oppenlander, 1973; Rankin and Hill, 1974; Armour, 1983). Crash rates also tend to increase with increasing traffic volume, although there is a threshold effect at high volumes (for example, Raff, 1953; Peter Casey and Associates, 1979), presumably because traffic flow becomes severely restricted. This has been demonstrated on multi-lane highways, where flow rates over 1,400 passenger cars per hour per lane have been shown to result in speed decreases (Highway Capacity Manual, 1985, cited in Várhelyi, 1996).

Encountering an intersection affects a driver's speed. A Hungarian study showed that drivers approaching a minor road intersection regulated by a give-way sign began to slow down on average 30 to 50 metres before the intersection (Bank and Draskóczy, 1982, cited in Várhelyi, 1996). When visibility at the intersection was good, drivers slowed down much earlier and passed through at higher speeds (when there was no traffic on the major road) than at intersections with poor sight. That is, with good sight distance, drivers could travel at higher speeds through an intersection than they could with poor sight distance.

A study in the Netherlands (van der Horst, 1990, cited in Várhelyi, 1996) observed that drivers approaching the give-way sign on the minor road, in an encounter with another road user on the main road, started braking about three seconds before the intersection, regardless of their approach speed, the type of intended manoeuvre, and the type of road user on the main road. Car drivers on the main road generally did not reduce their speed when encountering a car on the minor road.

At least two studies have been conducted on the effect of parked vehicles on speed. Research on the effect of parked vehicles has produced mixed results. For example, Smith and Appleyard (1981) found that vehicle speeds increased as the width of the road increased. Road width was affected by the presence of parked vehicles; therefore, when parked vehicles were present, speeds decreased. Joscelyn et al (1970) found that speeds were affected by the presence of objects, such as vehicles, on the road shoulder when lanes were up to 6.2 metres wide (speeds were unaffected at or above this lane width).

The presence of pedestrians on the roadside has been found in some studies to have little effect on driver speed. For example, the presence of children on the roadside had no effect on vehicle speed in the UK, although speed was reduced slightly when large groups of pedestrians were present (Thompson, Fraser, and Howarth, 1985). Even when a neighbourhood road safety campaign was conducted in New South Wales, there were only minor speed reductions on residential streets, and these reductions could have been due to factors other than the campaign (for example, weather). Várhelyi (1996) also conducted a review of vehicle speeds at zebra crossings when pedestrians were present (but not crossing) and found that the presence of pedestrians on the roadside had little or no influence on the speed of approaching vehicles. Unfortunately, the presence of pedestrians does lead to a high number of collisions in which a pedestrian is injured (see Part E). Hence, keeping speeds low in the presence of pedestrians is very important.

Time of Day and Weather

In spite of the road environment, speeds tend to be higher at night than during the day in Sweden (for example, Norrish, 1991; Nilsson et al, 1992, cited in Várhelyi, 1996). This may be because higher traffic congestion during the day may restrict a driver's choice of speeds. Perceptions of speed also differ between daylight and darkness. For example, more accurate judgements of rural road speeds are made at night than during the day (Triggs and Berenyi, 1982). This was attributed to *"the increased angular speed of elements visible to the driver which, under headlights, [appear]… much closer than normal and form streaming patterns produced by reflectorised road delineators"* (Fildes and Lee, 1993, p66). However, rural roads were perceived as less "safe" at night than during the day (Fildes et al, 1989), although perceptions of safety during the day and at night were similar when the roadside environment had a "walled" surrounding (such as trees close to the road). This is presumably because driving in a walled environment is similar to driving at night because of the restricted peripheral vision. The findings relating to perceptions of safe speeds and speed travelled during the day versus at night may seem contradictory, but if traffic congestion during the day was similar to congestion levels at night, it is likely that speeds would be higher during the day when drivers feel safer and are less accurate at estimating their speed.

Both road conditions and visibility are affected by weather, and speeds tend to reduce as weather deteriorates. For example, Kolstrud (1984, cited in Várhelyi, 1996) found that the mean speeds of passenger cars on straight and horizontal stretches of different types of roads in Sweden decreased on average by 2 kph when the roads were wet and by 8 kph when the roads were icy or snowy, compared to when they were dry. A review by Öberg (1994, cited in Várhelyi, 1996) of studies in Sweden of the mean speeds on icy or snowy roads compared to dry roads showed a 10-kph decrease in mean speeds on the icy or snowy roads. When the road is icy or snowy and there is also snowfall or snow-drift present, the mean speeds reduced by up to 20-25 kph compared to dry roads. Recently, Edwards (1999) found that traffic on the M4 motorway in south Wales travelled at a lower speed both in wet weather and in misty conditions than it did in dry conditions. However, the size of the speed reduction was not large enough to make up for the increased hazard from the weather, when considering required braking distance and loss of grip on the road surface.

2b: Controlling Traffic Speed

To a certain extent, road safety relies on the driver's willingness and ability to monitor and regulate his or her own driving behaviour. A number of speed control measures have been developed to assist drivers to monitor and regulate their speed.

Speed Limits

The primary method of managing travel speed is by imposing speed limits. To be effective, speed limits should be compatible with the design speed of the road, although the design speed tends to have a greater effect on a driver's choice of speed than does the speed limit (Várhelyi, 1996). For example, if the speed limit is lower than the design speed, this can lead to a general disregard for the limit. The effectiveness of speed limits in improving road safety was discussed in Part A. In general, a speed limit increase results in slightly increased speeds, which in turn increases fatalities, although the magnitude of these increases depends on the mean speeds before the speed limit change[33] (TRB, 1998). The opposite effect generally occurs following a decrease in speed limits.

It is important to recognise that speed limits alone do not tend to control driver speed effectively. They need to be supported with enforcement and engineering measures to keep drivers at a safe speed (TRB, 1998). Engineering measures are discussed in the following subsections, and enforcement issues are covered in Part C.

Advisory Speed Signs

To provide speed related information to drivers beyond the speed limit itself, advisory speed signs are sometimes posted at hazards, such as narrow curves, to slow drivers from their travel speed, without changing the speed limit at the location. However, recent research has indicated that the

33 That is, if the mean speed is already close to the new speed limit, mean speeds may change only slightly or not at all.

presence or absence of these signs has little effect on driver speeds, particularly for drivers who are familiar with the road, and that the signs are no more effective at slowing speeds than a curve warning sign on its own (Graham-Migletz Enterprises Inc, 1996, cited in TRB, 1998; Zwahlen, 1987, cited in Várhelyi, 1996). The poor compliance with advisory speed signs may arise because they are set unrealistically low (Chowdhury et al, 1998, cited in TRB, 1998) or based on engineering criteria rather than on human factors. Evidence for this has been provided in a recent survey by Transit NZ, which indicated that a large proportion of the New Zealand drivers surveyed believed that advisory speed signs were set at a speed much lower than the curve could be safely travelled (McCormick, 1998). This survey was conducted when there was a shortage in New Zealand of side thrust gauges (devices used to measure the sideways force as a car is driven along a road). However, when advisory speeds signs on curves were first set in New Zealand, using a side thrust gauge, they were found to reduce crashes on curves (Palmer, 1962). Thus, if advisory speeds are set using side thrust gauges, they may be more effective.

New Technology

Drivers' speeds in certain situations in the USA have recently been affected by new road-based technologies such as variable message signs. These electronic signs allow roading authorities to inform and warn drivers of crashes, adverse road and weather conditions, and other factors that require drivers to adjust their speed, as these conditions occur (Dudek, 1997, cited in TRB, 1998). Unfortunately, the effectiveness of the latest versions of these signs on speed reduction has not been studied. One use is as variable speed-limit signs, which inform the driver of the appropriate speed limit for the given conditions. Preliminary evaluations of the use of variable speed limits on autobahns in Germany have indicated they have reduced crash rates (Coleman et al, 1996, cited in TRB, 1998).

Mobile roadside speedometers are another new road-based technology. These devices measure a vehicle's speed and display the speed to the driver on a changeable message sign as the vehicle passes. Traffic speed in the vicinity of a mobile speedometer and a short distance downstream tends to reduce, compared to traffic speed without a speedometer present (Casey and Lund, 1993, cited in TRB, 1998). The device is particularly effective at reducing the speed of those exceeding the speed limit by at least 10 mph (16 kph) and reducing traffic speed in school zones. However, both enforcement and supporting publicity are needed for this speed reduction to occur (Comte et al, 1997, cited in TRB, 1998).

Devices similar to mobile speedometers, known as automatic speed warning signs, have proven effective in Norfolk, England (Farmer, Barker, and Mayhew, 1998). These signs display the speed limit to drivers who have exceeded a pre-set speed threshold. The aim is to warn drivers that the limit has been exceeded and to encourage them to slow down. A trial of the signs placed at entrances to rural villages in Norfolk found that the signs substantially reduced the mean speeds of vehicles travelling into the villages (the mean speed reduction over all sites was 4.3 mph). Furthermore, these speed reductions were maintained over a period of 12 months.

2c: Environmental Speed Control Devices

Measures to control traffic speed tend to rely on enforcement to be effective at maintaining safe driving speeds. Since it is not practical for enforcement authorities to oversee every section of road, engineering methods that keep speeds down have been developed. These engineering methods need to be designed according to the type of traffic on the roadway. For example, treatments used on local (urban) roads to reduce speeds are not necessarily useful for arterial routes that carry large volumes of traffic (Fildes and Lee, 1993).

Recently, the Dutch government has adopted a policy and implementation programme known as "sustainable" road safety, in which roads are clearly distinguished by their primary function, such as traffic flow, traffic distribution, and access (TRB, 1998). Speed design measures are used to reflect these primary functions. For example, residential environments are designed for the safety of vulnerable road users, such as pedestrians, whereas rural environments are designed for the safety of vehicles travelling long distances, taking into account travel time. Travel time is considered further in Part D. Whatever the function of the road, its design separates different road users, thereby reducing the risk of contact between vehicles travelling at different speeds.

Measures used to control the speeds of through traffic on residential roads are known as Local Area Traffic Management (LATM) measures. One of the earliest LATM devices, developed in the Netherlands, was the "Woonerf design" (Fildes and Lee, 1993). The "Woonerf design" involves pedestrians and vehicles moving in the same space, but with pedestrians having the right of way. Vehicle speeds

are reduced to walking pace through different engineering methods. Some shopping areas in New Zealand cities use a similar concept. The following are some types of engineering methods for reducing speeds, with an emphasis on LATM devices. These devices are normally used in area-wide schemes.

Speed Humps

Speed humps are designed to *"give the driver a clear physical feedback to keep a low speed"* (Várhelyi, 1996, p116). They are used on residential streets. They differ from bumps, which are designed for use in carparks and the like. Humps have *"dimensions in the order of a 4 metre radius and 10 cm height"*, whereas bumps have *"a radius [of] between 0.1 and 1.0 metre and height variations from 5 cm to 15 cm"* (Stephens, 1986, cited in Fildes and Lee, 1993, p70).

A review of studies on the effectiveness of speed humps found them to be very effective in reducing speeds, particularly at sites where speeds prior to hump installation were high (Stephens, 1986, cited in Fildes and Lee, 1993). Speeds tended to reduce by 40-45 kph when pre-installation speeds were 65-70 kph, and tended to reduce by 10 kph when pre-installation speeds were 30-40 kph. Engel and Thomsen (1992, cited in Fildes and Lee, 1993) concluded that speed humps were responsible for speed reductions of 1 kph for every 1 cm of height of the hump, although, presumably, there was a minimum and maximum height beyond which this was not true. Overall, speed humps have been shown to be an efficient speed-reducing physical measure (Várhelyi, 1996).

Road Narrowing, Chicanes, and Gateway Treatments

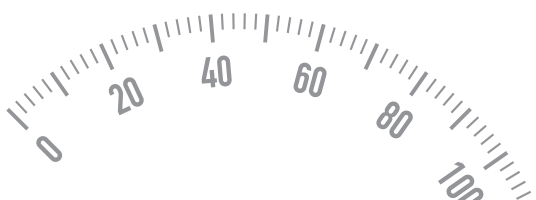
Another effective means of reducing speed is use of "diagonal slow points" or chicanes, which narrow the road and force the driver to change direction in order to manoeuvre through traffic islands on either side of the road. The optimal configuration of chicanes, suggested by Bowers (1986, cited in Fildes and Lee, 1993, p71), is that they *"should create 45 [degree] changes in direction of the carriageway approximately every 50 metres, with an offset of the full width of the carriageway"* (p61). A study of chicanes by Taylor and Rutherford (1986, cited in Fildes and Lee, 1993) showed that they reduced speed from above 50 kph to under 30 kph, although speeds were reduced for only about 40 metres on either side of the chicane. A Swedish study produced a similar finding; however, the chicanes were found to have caused some contact or potential contact between passing vehicles and to have generated some irritation from the public (TSV, 1985, cited in Várhelyi, 1996).

Similarly, gateway treatments produce the effect of passing through a constricted "gateway" opening by road narrowing combined with vertical elements such as trees and lamps (Fildes and Lee, 1993). A gateway treatment on rural roads at entrances to villages in Germany reduced the mean speed on the roads from 77 to 66 kph, although speeds were still well above the 50-kph speed limit (Alink and Otten, 1990, cited in Várhelyi, 1996).

Road narrowing alone, whether implemented along the whole road (or large sections of it) or at certain points through the use of traffic islands on either side of the road, can also reduce speeds. However, a Swedish study found that road narrowing had the smallest effect on speed reduction compared to humps and chicanes (Hydén et al, 1983, cited in Várhelyi, 1996). In Hydén et al's study, mean speeds reduced from 38-45 kph to 32-40 kph following road narrowing in Sweden. Similarly, in Denmark, road narrowing on residential streets produced a speed reduction of 4.7 kph (Engel and Thomsen, 1990, cited in Várhelyi, 1996).

Roundabouts

Studies have indicated that roundabouts are effective at keeping vehicle speeds down on straight roads (for example, Lynam, 1987, Schnull and Lange, 1990, Davies, 1988, all cited in Fildes and Lee, 1993). However, their effectiveness depends on the extent to which drivers are forced into a roundabout manoeuvre. For example, a large roundabout at the entrance to a town was more effective at slowing traffic than a mini-roundabout (Herrstedt, 1992, cited in Fildes and Lee, 1993). However, if properly designed, mini-roundabouts can also be effective at reducing speeds. For example, mini-roundabouts on arterial routes in a Swedish town reduced mean speeds through the intersections to 30-35 kph and reduced the risk of injury crashes by 40% (Hydén et al, 1995, cited in Várhelyi, 1996). Mini-roundabouts are often part of LATM measures.



System-Wide Effects

A through road in a built-up area can be environmentally adapted by using combinations of devices (for example, a gateway, chicanes, and general road narrowing) to reduce traffic speed. Elvik et al (1996, cited in Várhelyi, 1996) reviewed the findings of several studies that examined the effects of environmentally adapted through roads. The technique reduced the number of injury crashes by between 30% and 50% and, on average, mean speeds decreased from 53.7 to 44.4 kph. Herrstedt (1992, cited in Fildes and Lee, 1993) also reported speed reductions of 10 kph in 40-kph and 50-kph zones when a combination of devices was used.

In general, the overall benefits of LATM measures in reducing speeds and crashes in urban areas are clear and exceed the costs[34]. Fildes and Lee (1993) caution, however, that research has not explained the effects of the treatments on the entire roading system. One such effect is traffic migration, evidence for which was found by Vis, Dijkstra, and Slop (1990, cited in Fildes and Lee, 1993). They measured traffic volumes before and after the introduction of LATM devices in 15 areas in the Netherlands and observed reductions of five percent to 30% in traffic volumes using the adapted roads. If the speeding drivers use alternative routes, then there can be crash migration to these areas.

There are some other suggested problems with LATM measures (Fildes and Lee, 1993). For example, McKee and Mattingly (1977) found that environmental traffic schemes can disadvantage the elderly by increasing journey times and distances to shopping and recreational destinations. They also disadvantage older drivers by increasing the complexity of the driving task in their local area. They may also disadvantage the entire road user population by increasing the number of crashes because of their physical obstruction of the roadway. Furthermore, they may restrict the mobility and ease of access of emergency services such as ambulances. Unsafe driving behaviour due to frustration at the devices is another suggested problem. However, it appears that no research has been conducted to demonstrate the full extent of these problems.

2d: Perceptual Countermeasures to Speeding

Because drivers tend to choose their travel speed based on their perceptions of relative "safety" of a stretch of road, some roading measures have attempted to reduce drivers' perceptions of safety without actually reducing the safety of the road. The effectiveness of these "perceptual" countermeasures in reducing speeds is variable. Fildes, Leening, and Corrigan (1989) argued that these countermeasures are more likely to be successful in environments perceived as unsafe (for example, narrow walled environments) than in environments perceived as safe. In "safe" environments, speed choice is more dependent on social and enforcement factors, whereas in "unsafe" environments it is more dependent on perceptual factors. Some of the measures that have been shown to be effective are outlined below, but generally more research appears necessary in this area.

Transverse road markings are lines painted or adhered across the road surface. One use of this perceptual countermeasure is to place these markings (usually with decreasing spacing between the lines) to give the illusion that vehicle speed is increasing (Várhelyi, 1996). They are suggested for use at locations where drivers have been travelling at high speeds for some time and are then required to slow down, such as at motorway exits. Researchers have found transverse road markings to be effective at reducing speeds in the long term in both the UK (Helliar-Symons, 1981, cited in Fildes and Lee, 1993) and Australia (Jarvis, 1989, cited in Fildes and Lee, 1993). However, in a study by Rutley (1975, cited in Várhelyi, 1996), they lost some effectiveness after one year (possibly as drivers became aware of the illusion). Initially, these markings reduced mean speeds by 23%, but one year later the speeds were reduced by only eight percent from the initial mean. As well as producing the illusion of increasing vehicle speed, the markings may be effective because drivers are reacting to them as a warning device.

Another perceptual countermeasure is a narrowing of the width of the vehicle lane. A narrowing of the lane to a width of 3.0 metres or less is required to produce the perceptual effects needed for speed reductions (Fildes and Lee,

34 Several studies other than those already cited have shown crash reduction benefits and/or speed benefits from treatments on residential streets (for example, Kraay et al, 1984, Engel and Thomsen, 1990, Hydén et al, 1983, all cited in Várhelyi, 1996; Fisher and Van den Dool, 1989, Chua and Fisher, 1991, Kjemtrup and Herrstedt, 1992, Engel, Krosgaard, and Thomsen, 1989, Engel and Thomsen, 1992, Bowers, 1986, Engel, 1990, all cited in Fildes and Lee, 1993).

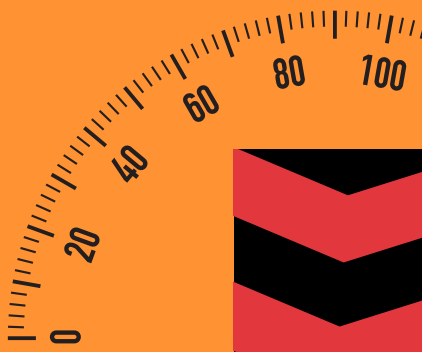
1993), although there is a minimum possible lane width through which vehicles can travel safely. Similarly, intensive road treatments are used in some locations to severely restrict the number and size of travel lanes though the use of wide white gravel medians with edge-line markings. These treatments have been shown to reduce travel speed in some locations.

A device that allows drivers to monitor their own driving behaviour through auditory rather than visual cues is an audible edge line. This is a strip along the edge of the road with evenly spaced, raised ridges that cause vibration and associated rumbling within the vehicle if the vehicle drives along or across it. Thus, speeding (or distracted) drivers will be alerted that they are leaving the carriageway and that they must lower their speed and/or correct their vehicle direction. Trial stretches of audible edge lines have been laid in New Zealand, but no research is available on their effectiveness. Queensland Transport in Australia found that fatal crashes on two sections of highway in Queensland fell by 39% over 12 months as a result of the introduction of audible edge lines (Queensland Government, 1997).

Conclusions

- Generally, drivers travel faster on stretches of road they perceive to be "safe" for higher travel speeds, regardless of whether this perception is accurate.
- Roadside development, such as trees in rural environments or houses in urban environments, play a significant role in the speed drivers perceive to be safe, and hence how fast they drive. There are a range of other environmental factors – such as the width, surface, and marking of the road, sight distance, traffic volume, time of day, and weather – that affect how fast vehicles travel on the road.
- Many of these factors themselves are dependent, particularly for new road developments, on the speed that the road was designed to be driven on.
- Speed limits alone are not effective in reducing vehicle speed. They need to be reinforced either through engineering (or environmental) measures or through enforcement activity.
- A range of perceptual and physical road and traffic measures are available to reduce speeds on the road. The use of these measures needs to be assessed on a case-by-case basis to minimise the risk that the devices become hazards in their own right, and to ensure that speed management problems do not simply migrate to other parts of the roading network.
- Most is known about Local Area Traffic Management (LATM) devices that place physical barriers in front of vehicles to slow their speed in urban areas.

Part C



Countermeasures: Enforcement, Publicity, and Penalties

The focus of Part C is on reducing speed by targeting those who drive at excess and inappropriate speeds. The more common, traditional approach to controlling vehicle speeds – that is, by focusing on changing the attitudes and behaviours of speeding drivers through enforcement, publicity, and a system of penalties – is discussed.

The first point of discussion addresses the continuing but misguided view among some individual drivers that they have superior driving skills such that they are able to drive at increased and inappropriate speeds on public roads without endangering themselves or other road users. Consistent with this view is a lack of support for strict police enforcement of laws relating to speeding. Such attitudes are in sharp contrast to our demands as a society for further police enforcement presence to protect our interests in almost any other area, whether that be in relation to burglary, rape, murder, fraud, domestic violence, or drink-driving. In many ways, this reflects the heart of the problem of speed on our roads – the denial that speeding is a fundamental safety issue.

The poor attitude of communities towards speeding needs to be addressed by a community attitude change programme. Such programmes have been successful in other areas, such as drink-driving, anti-smoking, and cancer prevention (sun-smart) campaigns. A similar success can be achieved with speeding; however, it requires an intensive and sustained campaign of education, enforcement, and publicity. Behavioural change is possible but does not happen overnight.

Enforcement is a fundamental mechanism for improving safety on our roads, and this Part also attempts to show the role that enforcement plays in reducing speed-related trauma. However, enforcement is just one strategy that needs to be employed. Just as important are publicising the enforcement and having a penalties system that reinforces safer behaviour. Part C concludes by returning to the comparisons, made in earlier sections of this review, of the relative risks of crashing when exceeding the speed limit or when under the influence of alcohol. Penalties for behaviours with similar relative risks are contrasted.

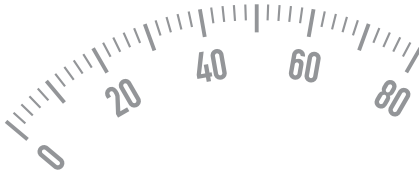
1: Driver Capability at Different Vehicle Speeds

Identifying and Responding to Hazards

As noted earlier, safe driving relies on two important human functions: perception and cognition. Drivers must not only observe and respond to the constant and predictable features of the road, but must also identify and respond to potential hazards in the traffic system. There is a wide range of potential hazards – for example, the vehicle in front stopping suddenly, a pedestrian stepping out, a vehicle turning in from a side street, a child running out, a cyclist swerving to avoid a pothole, or an animal sitting on the road. The detection of hazards or potential hazards requires constant vigilance on behalf of the driver. The ability to detect hazards is one of the skills that differentiates experienced from novice drivers (McKenna, 1999).

Once a hazard has been detected, the driver then has to make a decision about how to respond and to act accordingly. Várhelyi (1996) likened the driver to a complex "information processing system", continuously monitoring the traffic situation and reacting accordingly. In order to drive safely, the driver has to *"perceive, attend to, and comprehend relevant information, make decisions, and have the necessary skills and motivation to carry out the necessary manoeuvres"* (p21).

As a driver's vehicle speed increases, so does the speed with which the traffic situation "approaches" the driver. In addition, the higher the speed, the further ahead the driver has to monitor. Therefore, with the speed increase, the driver has to deal with more information and make more decisions per unit of time. There is, however, a limit to our information-processing capacity, and, if the amount of information presented in a certain space of time exceeds that capacity, not all of the information will be able to be processed. Therefore, given the same level of driving experience, a driver travelling at higher speeds has a greater risk of missing or misinterpreting visual or auditory information about potential hazards – or of even missing the critical cues altogether – than a driver travelling at lower speeds (Várhelyi, 1996).



Not only does a limited information-processing capacity affect the ability to detect hazards at high speeds, but so does the way the eyes are focused at high speeds. Häkkinen (1979, cited in Várhelyi, 1996) observed that, as speed increased, drivers' eyes tended to focus further ahead in the distance, giving less attention to peripheral observation. Hence, the detection of hazards, such as approaching pedestrians, in the peripheral view became more difficult.

Furthermore, when travelling at higher speeds, there is less time to make the appropriate response in order to avoid a hazard than there is at lower speeds. In Part A, we discussed how stopping distance factored into the relationship between speed and the risk of crashing. That is, a speeding vehicle will not only travel further than a slower-moving vehicle during the driver's reaction time, but it will take longer to come to a stop once the brakes are applied. Another way of looking at this is to compare sight distance – that is, the distance from a hazard at the time it is first viewed – with total stopping distance. At low speeds, the sight distance usually far exceeds the total stopping distance (given normal levels of friction). However, at high speeds, the sight distance may well be less than the total stopping distance required and, in such cases, a collision with the hazard (or another object in the attempt to avoid the hazard) is almost certain. Fildes and Lee (1993) termed driving at speeds where the stopping distance exceeds the sight distance "over-driving" (p17).

McLean et al (1994) determined the relationship between initial speed and stopping distance from an examination of 176 fatal pedestrian-vehicle collisions in the Adelaide area between 1983 and 1991. The relationship is presented in Figure C1 below. The straight, horizontal sections of each curve represent the distance covered during the driver's reaction time; that is, from the time the driver first views a pedestrian to the time the brakes are applied. During this time, the vehicle travels at the same speed as the initial travelling speed. Once the brakes are applied, the vehicle's speed decreases with distance travelled, slowly at first then more rapidly. McLean et al use Figure C1 to demonstrate the following example:

"Consider two cars travelling side by side at a given instant, one car travelling at 50 kph and the other overtaking at 60 kph. Suppose that a child runs onto the road at a point just beyond that at which the car travelling at 50 kph can stop. The other car will still be travelling at 44 kph at that point, a collision speed at which a pedestrian has more than a 50% probability of being fatally injured" (p40-41).

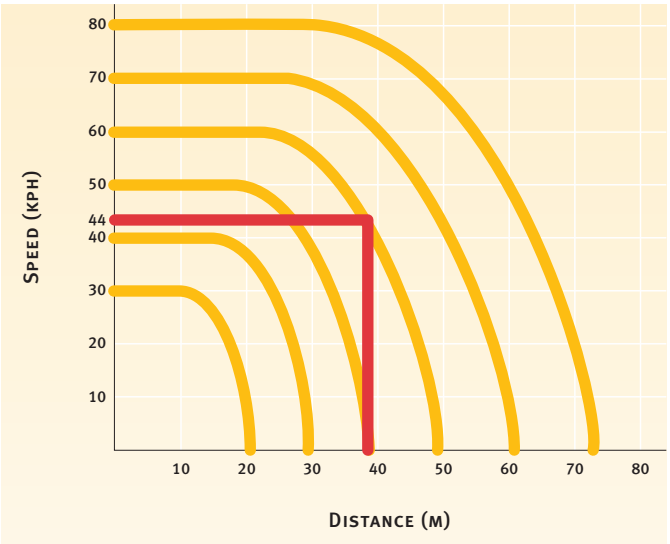


Figure C1 – The relationship between speed and distance travelled under emergency braking once the hazard is first viewed

Source: McLean et al, 1994, p40.
Notes: The straight, horizontal part of the curve represents reaction time. In the example, represented by the red line, the car travelling at 60 kph is still travelling at 44 kph at the point where the first car is stopped.

Even if a driver believes he or she is such a good driver that he or she can control a vehicle at high speeds, the distance required to stop follows the laws of physics and is not related to driver skill. Therefore, if a driver encounters a hazard on the road that necessitates emergency braking, the driver's ability to control the vehicle at high speeds will have no bearing on how quickly he or she can stop. Drivers may believe they can avoid a hazard altogether through skilled manoeuvring; however, often there is not enough space to manoeuvre around a hazard, particularly on New Zealand's narrow roads.

McKenna (1999) recently provided evidence that the ability to detect hazards influences driving speed in a simulated situation. He trained a group of drivers so that their hazard perception skills were improved. Following the training, the drivers were given a (laboratory) task that assessed the speed at which they chose to travel. McKenna found that the drivers with the hazard perception training chose a lower speed on the task than a control group who had not received any training. A likely reason for the lower speed choice was that the drivers trained in hazard perception skills had learnt that to reliably detect hazards they needed to travel at a speed that was reasonable, and not too fast. The control group, however, who were perhaps less aware of the importance of detecting hazards, were also not taking into

account that higher speeds reduced the time available for hazard detection. It is important to note, however, that these results were conducted within a laboratory and may not necessarily transfer to the on-road environment.

In addition to limiting their own ability to detect hazards and make the appropriate response, drivers travelling at high speeds also affect other road users' risk of crashing. In particular, because of the speed at which the speeding vehicle approaches other road users, these other road users will have less time to react to the speeding vehicle (Lay, 1984, cited in Zaal, 1994). The speeding driver may also endanger other road users because they underestimate the speeding driver's speed. For example, as discussed in Section 1 of Part A, Kloeden et al (1997) found that the most common types of crashes in their Adelaide study were those in which a vehicle turned right, either from the primary road itself or from a side street, across the path of vehicles travelling at free speeds on a primary road. Kloeden et al hypothesised that these crashes occurred because the approaching vehicle was travelling at excess speed and the turning driver misjudged the gap because he or she mistakenly assumed the approaching vehicle was travelling at about the same speed as the other free-flowing traffic on the road.

The findings by Kloeden et al (1997) demonstrate people's poor ability to judge the speed of approaching vehicles. Our sensory system was not designed to judge such high speeds, since such a skill is not ecologically necessary for walking or even running. Unfortunately, we overestimate our ability to judge the speed of traffic travelling at high speeds. Recent research at Monash University in Melbourne by Jennie Oxley and Andrea Dale (Fildes, 1999) has found that this poor ability to judge speeds is even worse in older people than in younger people, especially older pedestrians who are less mobile. These researchers hypothesise that a pedestrian's first judgement of whether it is safe to cross the road or a driver's first judgement of whether it is safe to execute a turn across traffic is based on the distance away from approaching vehicles, then this judgement is modified by the speed of the approaching vehicle. Since older people are much slower than younger people at making decisions, and also have poor judgement of speed, they may rely on distance alone and consequently get caught out by speeding vehicles.

Speed Adaptation

Another situation in which speed influences the risk to a driver and other road users is when the driver has been travelling at high speed for some time and then has to slow down to a lower speed – for example, when travelling on a rural road and then an urban road or when exiting a motorway into a residential area. At the lower speed, the driver tends to greatly underestimate his or her speed. This perceptual phenomenon, known as "speed adaptation" (for example, Fildes and Lee, 1993, p58), can lead to drivers travelling at speeds well above the speed limit in reduced speed areas, without being aware of it, hence creating a dangerous situation for themselves and other road users.

Conclusions

- Safe driving relies on two important human functions: perception and cognition. To drive safely, drivers must be able to identify and respond in a timely manner to potential hazards in the traffic system.
- Increased speed tends to decrease drivers' abilities to detect hazards and to make the appropriate response to them.
- When a hazard is encountered, the distance required to stop to avoid the hazard increases with increasing speed.
- Travelling at high speeds endangers other road users by increasing their risk of crashing, since other road users have less time to react to a speeding vehicle and may also underestimate the speed of a fast travelling vehicle.
- Travelling at a higher speed and then slowing to a lower speed (such as when moving to an area with a lower speed limit) can lead to an underestimation of the level of the reduced speed. Travelling at high speeds in areas requiring low speeds increases the crash risk to the driver and to other road users.

2: The Impact of Enforcement on Vehicle Speed

Enforcement of speeding laws is based on the assumption that a driver chooses the speed at which to travel and that that choice is made through a rational process of weighing the perceived advantages and disadvantages of exceeding the speed limit (Fildes and Lee, 1993). Perceived advantages may include time savings and thrill gains; perceived disadvantages may include the possibility of being caught by enforcement authorities and/or an increased chance of a crash. The aim of enforcement is to deter the driver from driving too quickly by increasing one of the disadvantages of speeding – the perceived likelihood of being caught. Enforcement is also used to detect and apprehend the speeding drivers for whom the increased risk of apprehension alone does not act as sufficient deterrent.

2a: Deterrence

Deterring the driver from speeding can be achieved by two different police enforcement mechanisms: specific deterrence and general deterrence (Fildes and Lee, 1993). In the speeding context, **specific deterrence** is targeted at the individual speeding driver and aims to change the specific individual's behaviour by catching and imposing some penalty (or punishment) upon that individual. Specific deterrence *"is based on the assumption that drivers who are caught and punished for speeding will be discouraged from committing further speeding offences"* (Fildes and Lee, 1993, p37). It often deters a driver from speeding at a particular site.

General deterrence targets the general population and aims to have a widespread effect on speeding by increasing public perception that speeding drivers will be caught, regardless of whether or not there is an actual increase in enforcement activities. The perception that enforcement is of a high intensity is encouraged when members of the population observe enforcement activities occurring (for example, seeing police apprehend a speeding driver) and when there is associated publicity about enforcement activity. General deterrence *"is based on the assumption that those exposed to the enforcement, apprehended or not, will be discouraged from speeding for fear of detection and punishment"* (Fildes and Lee, 1993, p37).

The effect of deterrence on the driver's decision to speed or not is dependent on the driver's perception of the risk of being caught, the driver's fear of being caught, and the driver's fear of the likely punishment (Zaal, 1994). The perceived risk of being caught has been identified as the most important factor in deterring the driver from speeding (Shinar and McKnight, 1985). For example, a study of the effects of a two-week police strike in Finland, during which time there was effectively no traffic enforcement, observed a 50% to 100% increase in the number of serious speeding offences (Summala, Naatanen, and Roine, 1980, cited in Fildes and Lee, 1993).

Contrary to expectations, some attitudinal studies conducted in the 1970s demonstrated that changes in the level of perceived risk of being caught when speeding do not necessarily correlate well with changes in enforcement levels. Ostvik and Elvik (1990) reviewed a number of the Scandinavian studies conducted in the 1970s in which enforcement levels in a region changed. They found that, when enforcement levels were increased on a given road, the perceived risk of being caught did not increase to the same extent that enforcement levels had. However, what is unknown is what questions were asked in the attitude surveys and the extent to which publicity associated with the increased enforcement also increased. More recent evaluations have demonstrated clearly that enforcement must be combined with publicity to have an effect on the perceived risk of apprehension (Havard, 1990).

The effectiveness of deterrence is also dependent on three punishment factors: the perceived certainty, the severity, and the swiftness (immediacy) of punishment. Evidence that the **perceived certainty** of punishment deters inappropriate driving behaviour was shown with the reduction in drink-driving crashes during the Random Breath-Testing campaign in Australia (Fildes and Lee, 1993). The campaign increased the probability of a drink-driver being caught and therefore incurring the associated penalty. Fildes and Lee (1993) also suggest the ongoing campaign led to a change in attitudes about drink-driving. However, Fildes and Lee (1993) caution that the threat of punishment alone is unlikely to have achieved the change in drink-driving attitudes during the campaign. For example, publicity, education, and penalties would have played some part in the attitude change.

The **severity** of punishment appears not to have as important an influence on behaviour as the certainty of

punishment. For example, in 1982, the fines for speeding in Sweden were doubled. Even though one-third of drivers knew of the new fine amounts, no changes in speeding behaviour were observed following the change (Aberg, Engdahl, and Nilsson, 1989, cited in Fildes and Lee, 1993). Similarly, no change in speeding behaviour was found when the fines were raised again in 1987 (Andersson, 1989). However, the effectiveness of the severity of punishment is dependent on the perceived risk of being caught. Therefore, if the perceived risk is higher, the severity of the punishment may play a larger role in deterring speeding drivers. For example, the evaluation of the intensive speed camera programme in Victoria between 1990 and 1991 found that receiving a traffic infringement notice in the mail affected speed behaviour for approximately two weeks (Rogerson, Newstead, and Cameron, 1994).

The effect on speeding behaviour of the **swiftness** of the punishment does not appear to have been studied; however, it will be discussed in the subsection on automated speed enforcement that follows.

Overall, the aim of speed enforcement is to apprehend speeding drivers and to deter all drivers from speeding. The methods used to enforce speed restrictions were reviewed extensively by Zaal (1994). Zaal divided the review into two enforcement approaches: traditional speed enforcement and automated speed enforcement. A discussion of each of these approaches follows.

2b: Traditional Speed Enforcement

The traditional approach to speed enforcement is to catch and punish the speeding driver at the site where the speeding offence occurred (or was detected). Usually, this involves the use of some form of speed measuring device – for example, a radar device operated from a parked police vehicle, or the police vehicle itself in the traffic stream – to detect the speeding offence. The offending driver is then stopped by the police at the nearest possible location, and is issued with some form of penalty notice, depending upon the severity of the speeding offence committed (Zaal, 1994).

Halo Effects

A difficulty with traditional enforcement is in ensuring that the deterrence effect does not occur only at the site of enforcement (TRB, 1998). The distance or time that the deterrence effects last from the enforcement site or activity are known as "halo effects" (Fildes and Lee, 1993). The **distance halo effect** refers to the distance (usually measured in kilometres) on either side of the enforcement site over which there is a reduction in speeding behaviour. The **time halo effect** typically refers to the time (in days) from the enforcement activity during which speeds at the enforcement site are reduced.

Barnes (1984, cited in Zaal, 1994) examined the extent of distance halo effects around enforcement from a marked police car in New Zealand. Reduced speeds began more than two kilometres before the site (due to headlight flashing, radar detectors, and so on) and lasted between four and six kilometres after the site – a total of up to eight kilometres. When the enforcement is more strategically used, the distance halo effect is estimated to be larger. For example, Brackett and Edwards (1977, cited in Ostvik and Elvik, 1990) evaluated the effects of an American study in which a stationary police car was randomly moved from place to place along a long stretch of road. The aim was to create the impression that there was a massive concentration of enforcement along that road. They found that speeds were reduced up to 20 kilometres from the stationary car.

Hauer, Ahlin, and Bowser (1982) examined both distance and time halo effects at enforcement sites. They found that mean speeds at the enforcement sites were reduced, but that the effect of the enforcement – the level of the reduction in mean speeds – reduced by half every 900 metres downstream from the enforcement site. The time halo effect was examined by observing individual vehicles over several days during and after enforcement. They found that vehicles exposed to enforcement at a site only once reduced their speeds at the site for up to three days following the enforcement. Vehicles that encountered enforcement at a site over five days reduced their speeds at the site for at least six days after the last day of the enforcement.

Nilsson and Sjorgen (1982, cited in Fildes and Lee, 1993) compared time halo effects after repeated exposure to a site and after a single exposure. A number of different types of enforcement procedures were examined: marked and unmarked police cars, radars, and helicopters. They found a significant difference in speeds over time between vehicles exposed only once to the radar or marked police car and vehicles repeatedly exposed to the enforcement over six days. Also, for those exposed to six days of radar or marked police car enforcement, the reduction in speeds remained

for an average of 10 days, and six days of helicopter surveillance led to a time halo effect of 17 days. However, there was no time halo effect for exposure to the unmarked police car.

More recently, Vaa (1997) examined the time halo effects of six weeks of very high enforcement levels (averaging nine hours per day) on a 35-kilometre length of highway in Norway. Speeds were measured (unobtrusively) in 60- and 80-kph speed-limit zones for two weeks before the enforcement, again during the enforcement, and again for eight weeks afterwards. In the 60-kph zone, "speeding" was defined as exceeding 70 kph; while, in the 80-kph zone, it was defined as exceeding 80 kph[35]. During the enforcement period, there was a reduction in the proportion of drivers who were speeding in both of the speed zones. In the 60-kph zone, this reduction lasted up to eight weeks after the enforcement period. In the 80-kph zone, the reduction in the proportion of speeding drivers lasted up to six weeks.

In summary, the size of the time and distance halo effects appears to depend on the enforcement strategy. When enforcement is of a high intensity, the effects can last up to eight weeks. When enforcement is of a high intensity and randomly placed, a reduction in speed behaviour can extend up to 20 kilometres from the site.

Enforcement Visibility

Traditional speed enforcement can be based on either a high-visibility or a low-visibility approach (Zaal, 1994). The **high-visibility approach** aims to reduce speeds by deterring drivers from speeding at the site of the enforcement and by increasing the overall perceived risk of being caught. The **low-visibility approach** aims to reduce speeds by making drivers aware that enforcement is not predictable and, hence, they cannot predict when to slow down to avoid being caught. Both approaches rely on high levels of publicity about the presence of enforcement.

Some evidence of the effectiveness of the high-visibility approach was demonstrated in a study of crash "black spots" (sites involving a high crash history) on a sample of New Zealand rural highways (Graham, Bean, and Matthews, 1992). The study involved measuring vehicles' speeds at six sites from November 1988 to April 1989 and from late November 1989 to March 1990. At three of the sites, traffic patrols were placed in random, highly visible positions and required to patrol the sites for one- and two-hour periods on 13 days each month from December 1988 to March 1990. The remaining three sites were used as control sites. All sites were about 18 to 30 kilometres in length, without towns, major intersections, or terrain that would affect normal open-road speeds. Graham et al found small reductions in median speeds at the test sites compared to the control sites[36]. The size of the speed reduction at each site was dependent on the level of enforcement activity.

A similar enforcement approach to that of Graham et al (1992) was conducted throughout Queensland, Australia (Newstead, Cameron, and Leggett, 1999). The approach, known as the Queensland Random Road Watch programme, involved dividing each police jurisdiction in Queensland into a number of sectors and the week into a number of time blocks. Enforcement was then randomly assigned to a sector for an entire week, with the time of day of the enforcement also randomly assigned. Enforcement involved a conspicuous stationary marked vehicle undertaking general road safety enforcement duties during the randomly assigned time in the randomly selected sector. Newstead et al (1999) found that in the first year of the programme there was a reduction in crashes of all severities in all police jurisdictions (this reduction was statistically significant for all but one police jurisdiction), with the largest reduction occurring for fatal crashes. For example, outside metropolitan Brisbane there was an estimated 31% reduction in fatal crashes and an estimated 13% reduction in serious injury crashes. A broadly similar programme to the Queensland Random Road Watch programme, known as "Bullseye", is currently being conducted in New Zealand (see Garvitch, 1999, for details).

The low-visibility approach, when utilising traditional enforcement methods, tends to be less effective at deterring drivers from speeding than the high-visibility approach. For example, Galizio, Jackson, and Steele (1979, cited in Fildes and Lee, 1993) found that the presence of a marked police vehicle resulted in a significant speed reduction, but the presence of an unmarked police car resulted in no change in traffic speed. However, as Parker and Tsuchiyama (1985, cited in Zaal, 1994) stated, the effectiveness of an unmarked police vehicle on speed reduction is dependent on the perception by road users that any vehicle could be an unmarked police vehicle. This perception can be encouraged by high levels of publicity regarding the use of unmarked vehicles in enforcement programmes, as well as increasing the visibility of situations in which an unmarked police vehicle stops a speeding motorist. For example, visibility can be increased if

35 The definitions differed between speed-limit zones because of software constraints.

36 Relative to the changes at the control sites, the median speeds decreased at the test sites by 1.8 kph, 0.3 kph, and 1.1 kph in the mornings, afternoons, and evenings respectively.

a police car uses flashing lights when apprehending a speeding driver. The low-visibility approach has been found to be effective in the area of automated speed enforcement. This will be discussed later in this section.

Enforcement Mobility

Whether to use stationary or moving police vehicles has been another area of research on enforcement. Shinar and Steibel (1986) compared the speeds of vehicles in the presence of stationary or moving police vehicles. They found that the presence of either type of enforcement reduced speeding by 95% at the enforcement sites. The magnitude of the initial speed reduction was the same when encountering either the stationary or the moving police vehicle. However, police vehicles moving within the traffic stream had a greater effect on the speeding behaviour of individual road users for a longer time and over a longer distance.

Armour (1984) has suggested that moving police vehicles are more effective overall because of the limitations in the use of stationary vehicles, such as the limited number of suitable sites and the rarity of road users encountering more than one stationary vehicle on a journey. Southgate and Mirrlees-Black (1991, cited in Zaal, 1994) have suggested that stationary speed enforcement could be more effective if there was tactical placement of stationary vehicles. For example, using two or more vehicles located short distances apart would increase the distance halo effect and increase the overall perception of the risk of being caught.

Overall, it has been suggested (Bailey, 1987, cited in Zaal, 1994) that stationary vehicles should be used at locations with high crash rates, because of their effect on speed reduction at a site. Also, moving vehicles should be used on stretches of road where speeds are higher than appropriate, because of their effect on the speeds of drivers over a long distance. This type of approach is less relevant now with the availability of speed cameras (see Section 2c).

Optimising Traditional Enforcement

It appears from the research that traditional enforcement may be effective if it is employed strategically. Jernigan (1986, cited in TRB, 1998) reviewed selective enforcement programmes in the United States and found that the most successful programmes were:

- *"deployed at specific locations and at times when unwanted behaviour is most likely to occur;*
- *made highly visible to the public; and*
- *maintained for more than a single year"* (cited from TRB, 1998, p151).

Hunt, McKenzie, and Edgar (1992) conducted a study in New Zealand that aimed to optimise traditional enforcement. They developed an enforcement programme for six urban and five rural sites in the Manawatu area of New Zealand that had a high crash history ("speed black spots"). The sites were subjected to intensive enforcement over a two-month period. Along with low-visibility enforcement techniques (such as the use of unmarked police vehicles), there was a large publicity campaign at both the national and local level. At the national level, the campaign was conducted during the middle four weeks of the enforcement period. The aim of the campaign was to educate the public about "speed black spots" and about the intent to vigorously enforce speed limits in such areas. At the local level (Manawatu area), education was provided – for example, through newspaper advertisements – about where the speed back spots were. In addition, a new traffic sign was erected at each of the black spot areas, printed with the words "SPEED BLACK SPOT".

Speed surveys were conducted at the enforcement sites and at eight control sites, both before and after the trial. A public attitude survey was also conducted both before and during the trial. Hunt et al (1992) found decreases in mean speed from before to after the trial at all enforcement sites, ranging from 1.8 to 4.6 kph. The difference in mean speeds between the enforcement and control sites was significant for urban areas. Using Nilsson's (1982) formula (discussed in Part A), Hunt et al calculated that the speed reductions of the magnitude obtained could result in a 17% reduction in urban injury crashes and a seven-percent reduction in rural injury crashes. Results from the public attitude survey indicated that the publicity about black spots increased the public's understanding of the term and increased awareness of the speed enforcement.

A small subsequent study was conducted by Hunt et al (1992) in the Bay of Plenty region, in which the "SPEED BLACK SPOT" signs were displayed at local black spot areas; however, there was no associated enforcement. They found that vehicle speeds did not decrease at the sites even when the drivers knew what the signs referred to. Together, these studies demonstrate that, to achieve a reduction in speeds, both targeted, visible enforcement and supporting publicity about the enforcement are needed.

Problems with Traditional Enforcement

"The problem with traditional enforcement methods is that [the] limited policing resources available, as compared to the relatively high number of speeding motorists, results in a low perceived risk of apprehension" (Zaal, 1994, p79). As reported earlier, the perceived risk (or the perceived certainty) of being caught has been identified as the most important factor in deterring the driver from speeding (Shinar and McKnight, 1985). Zaal (1994) reported that the *"perceived risk [of being caught] is dependent upon the level of enforcement activity, the use of associated publicity, and whether or not motorists actually observe the reported increase in enforcement"* (p79). Thus, although publicity is important, if enforcement levels are low, publicity tends not to deter drivers from speeding in the long term (Harvard, 1990). Hence, low enforcement activity and low levels of publicity lead to a low perception of being caught, which, in turn, leads to an increase (or at least no reduction) in speeding behaviour. Unfortunately, because of limited policing resources, it is difficult to increase and maintain the increase of speeding enforcement activity. Recent developments in enforcement technology can, however, overcome these problems.

2c: Recent Enforcement Technology: Automated Speed Enforcement

Automated speed enforcement technology typically consists of a detection device (such as a radar device), a processing unit, and an image recording device (such as a still camera or a video camera). The detection device measures the speed of each oncoming vehicle and feeds this information to the processing unit. If the vehicle's speed exceeds a predetermined level, the recording device records an image of the vehicle and the driver. Also typically recorded on the image is the time and date of the offence and the speed of the vehicle. The information is then used to identify the owner and, if necessary, the driver of the vehicle. An infringement notice or warning letter is then mailed to the registered owner of the vehicle (Zaal, 1994).

Advantages of Automated Enforcement

Automated speed enforcement devices have several advantages over traditional enforcement (Zaal, 1994; Rothengatter, 1990; TRB, 1998). For example:

1 They increase the probability of detection without overextending front-line police resources, since the police do not have to spend long periods of time detecting and apprehending speeders. This also means that the "enforcement pause" is eliminated; that is, the device does not need to temporarily cease operation while the speeding driver is apprehended.
2 They increase road users' perceptions of the risk of getting caught, through direct observation, associated publicity, and/or receiving a ticket when they were unaware they had been detected. Hence, the devices have a higher deterrence effect.
3 They increase the fairness of enforcement by taking "officer discretion" out of the equation.
4 They have been reported to lead to less dispute by motorists regarding their fine and, hence, provide a more efficient ticketing and payment process.
5 They can be used in locations where patrol vehicles cannot be safely and effectively deployed.

Overall, the largest benefit of automated speed detection devices appears to be in increasing the perceived risk of apprehension (Rothengatter, 1990). This is most effectively achieved through the widespread and highly publicised use of the devices.

The most common automated speed enforcement device is the speed camera. Several studies have examined the effectiveness of these devices.

International Speed Camera Use

The first study that examined the use of speed cameras, conducted in West London, demonstrated that speed cameras were very successful at reducing speeds (Winnett, 1994). Another early study examined the effect of speed cameras introduced on a section of German autobahn (motorway) (Lamm and Kloeckner, 1984). German autobahns are not subject to a national speed limit, although approximately 30% have a local speed limit. The section of highway on which the speed cameras were introduced had a very high crash rate[37] and in 1972, the year before the introduction of the speed cameras, the section was given a speed limit of 100 kph[38]. The imposition of the speed limit led to an immediate 30-kph reduction in mean speeds, and the introduction of speed cameras reduced mean speeds by a further 20 kph. The combined effect of the speed limit and the cameras reduced crashes on the autobahn by 91%. This compared to a 56% reduction on the entire autobahn network in the same period (Ostvik and Elvik, 1990).

37 The section of highway had a steep downgrade with a design speed of 100 kph. There were about 200 crashes per year in 1970 and 1971 on a section 7.2 kilometres in length.

38 Prior to 1972, there was no speed limit for passenger vehicles on the autobahn. The majority of vehicles on the studied section exceeded 100 kph during this time.

Since the early study, speed cameras have been further introduced and evaluated in England. For example, the introduction of 32 fixed speed camera sites in Oxfordshire resulted in an overall reduction in fatal and serious injury crashes at the speed cameras sites (and up to 1 km each side of the site) of 23% (Hook, Kirkwood, and Evans, 1995). Corbett (1995) also evaluated the introduction of fixed speed cameras in England. In the first six months, mean speeds reduced by 10% (Darbyshire, 1993; cited in Corbett, 1995) and crashes dropped by 22%. Furthermore, 29% of drivers surveyed reported driving more slowly in general, although these drivers tended to be those who reported they did not know the camera locations.

Norway is another country that has introduced speed cameras and found a positive effect. For example, Elvik (1997) found that the introduction of speed cameras (known as photo radars in Norway) at permanent sites resulted in a decline of 20% in the number of injury crashes, when controlling for general trends in the number of crashes and "regression to the mean effects"[39].

Australasia appears to be an area where speed camera programmes have been used extensively. There have been several evaluations of these programmes in Australia. For example, a study of the introduction of speed cameras in New South Wales found they were associated with a 22% reduction in crashes at the speed camera locations (Loyola College, 1995).

Cameron, Cavallo, and Gilbert (1992) conducted an evaluation of the speed camera programme in Victoria (Australia). Speed cameras were introduced extensively in 1989 in response to a rising road toll[40]. The speed cameras were supported by an intensive mass media publicity campaign. In the first two years of the programme, every vehicle in the state of Victoria was on average having its speed checked by the cameras once in every six-week period (Ogden, Bodinnar, Lane, and Moloney, 1992). The number of measured vehicles exceeding the enforcement threshold was 23.9% in December 1989, the year the programme was first introduced; this had declined to 13% by December 1990, and it declined further to 9.4% by December 1991 (Bourke and Cooke, 1991, cited in Zaal, 1994). An analysis of the change in casualty crashes due to speed cameras during times of the day when alcohol consumption was low[41] revealed a 32% reduction in such crashes on Melbourne's arterial roads, a 20% reduction in country towns, and a 14% reduction on rural highways. The severity of injuries resulting from casualty crashes reduced across Victoria by between 28%, between July 1990 and February 1991, and 40%, between March and December 1991.

An evaluation of the localised effects of the Victorian speed camera programme found a significant reduction in casualty crashes within one kilometre of a speed camera site (Rogerson et al, 1994). They also found that speeding behaviour was reduced for approximately two weeks after a speed camera ticket was received.

The New Zealand Speed Camera Programme

In New Zealand, speed cameras were introduced in October 1993. They were placed on stretches of road with a record of speed-related crashes. The stretches of road (or "sites") were signposted with "SPEED CAMERA AREA", and the cameras were highly visible. At rural sites, the cameras were mobile and vehicle-mounted. At urban sites, the cameras were either mobile and vehicle-mounted or fixed and mounted on poles. Thirteen fixed cameras were rotated around the 55 urban sites. The cameras at all sites were set to deploy when vehicles travelled at greater than the 85th percentile speed for the site, as measured unobtrusively (Mara, Davies, and Frith, 1996). There was substantial publicity both before and after the introduction of speed cameras.

Mara et al (1996) examined the effects of the New Zealand speed camera programme. They calculated that the programme resulted in significant reductions of 23% in fatal and serious crashes at urban speed camera sites and 11% in fatal and serious crashes at rural speed camera sites. However, they failed to detect any significant effects outside speed camera sites, except at urban sites at low alcohol times[42]. They suggested that the speed camera programme needed to be examined to determine how the effects could be generalised to areas where cameras were not in operation.

39 Regression to the mean effects refer to a high number of crashes one year followed by a number closer to the mean number of crashes (lower) the following year (or vice versa).

40 The Random Breath Testing programme was also introduced in response to the rising road toll.

41 Eighty-two percent of the speed camera enforcement was conducted during times of low alcohol consumption.

42 Low alcohol times are between 3am and 10pm. Approximately 96% of speed camera enforcement was conducted during low alcohol times.

A suggested variation in the New Zealand speed camera programme that was predicted to generalise its effectiveness past the limits of the speed camera sites was to use hidden cameras rather than visible ones. Hidden cameras with publicity have the potential to reduce the predictability of the cameras and hence have a more generalised effect. A trial of hidden cameras was therefore conducted on open roads in the Midland[43] police region of New Zealand from July 1997. All of the speed camera sites in the Midland region that had previously used visible speed cameras were signposted with "HIDDEN CAMERAS MAY OPERATE" and enforced with hidden cameras that could be operated from a free-standing tripod or a hidden vehicle. In other parts of New Zealand, visible cameras continued to be operated[44]. Substantial publicity was given about the trial, particularly in the month before it.

Keall, Povey, and Frith (in press) evaluated the effectiveness of the hidden cameras, during their first year of operation in the Midland region, compared to the visible speed cameras operated outside the Midland region. They calculated that mean speeds in the Midland region fell by 2.3 kph at speed camera sites and 1.6 kph outside speed camera sites, compared to the rest of the country. The speed reductions at the speed camera sites were associated with a 22% reduction in crashes and a 29% reduction in casualties at the sites. Furthermore, in the Midland region, there was an 11% reduction in the open-road crash rate and a 19% reduction in the casualty rate. The greater effect on casualties than on crashes indicates an effect on crash severity. The findings of an effect on crashes at the sites and throughout Midland indicate that the hidden speed cameras in the Midland region had both a specific and a general deterrence effect. Attitudes by the public in the trial region, as measured by the Annual Public Attitudes Survey (Land Transport Safety Authority, 1999a), initially indicated a growing acceptance of hidden cameras and a recognition that drivers did not seem to be speeding as much as before. However, this effect weakened to pre-trial levels after the first year of the trial.

Overall, speed cameras have reduced crash rates and speeds in the many countries that have employed them (Elvik, 1997). However, the full potential of speed cameras is as yet untested as, in many jurisdictions, political considerations have limited their usage.

Issues Relating to the Use of Automated Enforcement

One issue regarding automated enforcement is the delay between the offence and punishment (Zaal, 1994). In New Zealand, the delay tends to be between approximately two and three weeks. Automated enforcement tends to create a high level of punishment certainty (Zaal, 1994) and, combined with the high level of perceived risk of being caught that speed cameras generate, punishment swiftness is probably less important in the process of deterring drivers from speeding. Furthermore, studies of speed camera programmes have found significant reductions in speeding behaviour, indicating that they are effective at deterring drivers despite the delay in punishment.

Another identified problem with automated enforcement is that the speeding driver often does not immediately realise that his or her offence has been detected (Rothengatter, 1990). However, this problem may be reduced by prompt ticketing of offenders and by other visible means such as the use of flashes on the cameras. Oei (1993, cited in Zaal, 1994) indicated that another way this problem may be overcome is by placing a board several hundred metres after the enforcement site that displays information regarding the driver's speeding offence. However, this mechanism will only be effective if all drivers detected speeding are given an infringement notice.

Community acceptance of speed cameras is also identified as a potential problem with their use (Zaal, 1994). However, in New Zealand, the Annual Public Attitudes Survey (Land Transport Safety Authority, 1999a) found the support for speed cameras was high (see Part E).

43 The Midland police region includes the Waikato, Bay of Plenty, and Gisborne local government regions, plus the Wairoa District.

44 There was a net increase in camera hours of 26% in the Midland region relative to the rest of the country.

Conclusions

- Enforcement activities aim to deter drivers from speeding.
- Specific deterrence aims to change a specific individual's speeding behaviour, often at a particular site; general deterrence aims to have a widespread effect on speeding behaviour.
- The effect of deterrence on the driver's decision to speed or not is dependent on:
  - the driver's perception of the risk of being caught;
  - the driver's fear of being caught;
  - the driver's fear of the likely punishment.
- The most important of these seems to be the driver's perception of the risk of being caught, which is boosted by publicity about the enforcement activities.
- The effect of deterrence appears to also be dependent on the severity and swiftness of the associated punishment, although these effects can be rather subtle and unpredictable.
- Traditional approaches to speed enforcement usually involve activities associated with the on-site detection, apprehension, and punishment of the speeding driver.
- The distance halo effect refers to the distance in kilometres from an enforcement site within which speeds are reduced. The time halo effect refers to the days from enforcement activities that speeds at the enforcement site are reduced.
- Under certain police operational conditions, time and distance halos of two weeks and 20 kilometres, respectively, can be expected.
- Traditional speed enforcement can take a high-visibility or low-visibility approach; however, there must be a high level of associated publicity to increase the perceived risk of being caught, particularly with the low-visibility approach.
- A randomised visible traditional enforcement approach has produced large reductions in crash levels in Queensland, Australia.
- Careful planning of traditional speed enforcement approaches can optimise its effectiveness.
- Research supports the suggestion that stationary enforcement vehicles be used at known crash locations and moving enforcement vehicles be used on stretches of road where speeds are high.
- Traditional enforcement tends to result in a low level of perceived risk of being caught when police resources are low.
- Automated speed enforcement typically involves recording the image of a vehicle exceeding a predetermined speed limit. The image is used to identify the vehicle owner, who is mailed a speed infringement notice.
- The largest benefit of automated speed detection devices is that of increasing the perceived risk of being caught.
- Speed cameras have had positive effects on crash rates and speeds in the many countries that have employed them.
- Hiding site-based speed cameras, and widely publicising their potential presence, has shown benefits in the Midland police district of New Zealand, producing general as well as specific deterrence.

3: Publicity

Throughout the above discussion of enforcement effectiveness, the use of publicity has been mentioned. In the context of speed enforcement, publicity is often used to inform road users of the likelihood of being caught and punished for committing a speeding violation. Hence, it aims to increase the perceived risk of being caught. Publicity is, however, only effective in the long term when it realistically portrays enforcement levels. Publicity alone, without enforcement, tends not to deter drivers in the long term from committing a speeding offence (Havard, 1990). Similarly, enforcement without publicity is less effective at deterring speeding in the long term.

Several studies have examined the combined use of publicity and speed enforcement. For example, Riedel, Rothengatter, and de Bruin (1988) examined speeding behaviour on the open road following publicity and enforcement. They found that publicity alone produced some speed reductions. However, the combined use of publicity and enforcement had a much larger effect.

Cameron et al (1992) examined the effect of a speed camera programme combined with publicity in Victoria, Australia. They found that, when the publicity began, there was an initial significant reduction in the frequency of casualty crashes. This reduction occurred independently of the actual increase in the level of speed camera enforcement. However, greater reductions occurred during periods when high levels of publicity were combined with high levels of enforcement. Zaal (1994) concluded from the study that *"media publicity can be an effective means of initially raising and then maintaining community awareness of speed camera enforcement operations, but… [that] the greatest speed reduction benefits result from the enforcement operations themselves"* (p96).

As well as increasing the perceived risk of being caught, publicity has the benefit of increasing community awareness of and support for an enforcement programme (Zaal, 1994). For example, Freedman et al (1990, cited in Zaal, 1994) found that publicity associated with the introduction of speed cameras resulted in high levels of awareness of and community support for the use of speed cameras.

Recent publicity to reduce speeding behaviour in New Zealand has focused on both enforcement activities and the consequences of a crash. For example, the advertising side of the Supplementary Road Safety Package (SRSP) in New Zealand comprises advertisements about enforcement as well as graphic advertisements about the physical and emotional consequences of a crash. The SRSP was introduced in 1995/96 to build on the success of the high-intensity Compulsory Breath Testing (CBT) and speed camera interventions, which it supplemented with additional enforcement resources and hard-hitting national advertising. Vulcan and Cameron (1998) conducted an independent evaluation of the SRSP. They estimated the savings in road casualties associated with the SRSP during its first two years were 109 fatalities and 1,029 serious injuries. The analysis of the effectiveness of the components of the SRSP aimed at speeding indicated that, during low alcohol hours, there was a 14% reduction in serious casualty crashes in urban areas (but no reduction for rural areas) during the first year of the SRSP. During the second year, however, there was a 26% reduction in serious casualty crashes in the urban areas and a 14% reduction in such crashes in the rural areas (again, during low alcohol hours).

Conclusions

- Publicity is very important for increasing the effectiveness of enforcement.
- Publicity alone can reduce speeds in the short term; however, publicity without enforcement will not have long-lasting speed reduction effects. Likewise, enforcement without publicity will not have long-lasting speed reduction effects.
- Hard-hitting publicity can be based on the emotional and physical consequences of a crash as well as on enforcement activities. Some campaigns have successfully combined these approaches.
- New Zealand's Supplementary Road Safety Package, for example, has been shown to be very effective in reducing the death and injury toll on our roads.

4: Tolerance Levels on Speed Limits

A speed tolerance represents *"a margin above the maximum speed limit within which drivers are not apprehended or punished"* (Fildes and Lee, 1993, p49). Most speed enforcement agencies employ speed tolerances, although the level of the tolerance varies across agencies due to legal requirements or equipment constraints. *"In Australia, speed tolerance levels of 10% plus 3 kph above the posted speed limits or a fixed margin of 10 kph are common policing practice"* (Zaal, 1994, p97).

The rationale for enforcing above a speed tolerance is to allow for errors in a vehicle's speedometer, as well as inaccuracies in the speed measurement equipment and procedure, that could be used as a challenge to a penalty in the courts (Fildes and Lee, 1993). Furthermore, since a speed tolerance means enforcement is concentrated on the fastest speeders, public acceptance of the enforcement is more likely. However, the other side to using a speed tolerance is that, as the public become aware of the tolerance level, they may use it as the de facto speed limit (Fildes and Lee, 1993). Furthermore, the tolerance level may for some drivers become the desired speed of travel, or even a guide to the minimum speed at which to travel (Nilsson, 1990).

Evidence that the public use the tolerance levels in deciding their choice of travel speed was demonstrated in a study by Andersson (1989). Andersson evaluated the effects of a 3- to 6-kph reduction in tolerance levels in the urban areas of two Swedish cities. There was a high level of publicity about the reduction in tolerance levels. Four cities in which the tolerance did not change were used as a control. During the year of the reduced tolerance, vehicle speeds fell in the two cities by approximately 1 kph, whereas at the control sites vehicle speeds increased by 0.5 kph. Andersson suggested that the lower speed was due to the increased risk of detection, which affected a large group of motorists.

Speed tolerances cannot be eliminated entirely, because of the possibility of technical challenges in courts. However, Fildes and Lee (1993) suggest that *"the only realistic solution seems to be… [to adopt] minimal tolerance levels in conjunction with rationalised speed limits based on what is an appropriate and acceptable travel speed"* (p50).

5: Penalties

The threat of incurring a penalty for committing a speeding offence is a crucial component of the deterrence process. The following describes some types of penalties and their effectiveness.

Fines

The most common penalty imposed on drivers who are caught committing a speeding offence is a fine (Zaal, 1994). Table C1 displays the current fines for speeding within New Zealand.

Offence: Exceeding the speed limit by…	Infringement Fee ($)	Demerit Points
up to 10 kph	30	10
11 - 15 kph	80	20
16 - 20 kph	120	20
21 - 25 kph	170	35
26 - 30 kph	230	35
31 - 35 kph	300	40
36 - 40 kph	400	50
41 - 45 kph	510	50
46 - 50 kph	630	50

Table C1 – Current fines, and demerit points, for exceeding the speed limit by up to 50 kph in New Zealand

Sources: LTSA (1999b) and Schedule 4, Part II of the Land Transport Act, 1998.
Note: Demerit points do not apply to speeding offences detected by a speed camera.

Fines are an important enforcement tool. The effect of the size of the fine is less clear. For example, as discussed above, when the size of the fine was increased in Sweden, there was no detectable change in speeding behaviour (Aberg et al, 1989; Andersson, 1989, cited in Fildes and Lee, 1993). However, Fildes and Lee (1993) suggest that there is likely to be a floor limit, above which the size of the fine does have an effect on speeding behaviour. They predict this limit was not reached in the Swedish studies.

Demerit Point Schemes

Another system of penalties is the allocation of demerit points. Every time an individual commits a speeding offence (or another relevant traffic infringement), a number of points are allocated and recorded against that person's driving record. If the driver accumulates more than the maximum number of points permitted within a specified period of time, additional penalties, such as licence suspension, are imposed (Zaal, 1994).

In New Zealand, demerit points are given for all speeding infringements other than speeding offences detected by a speed camera. If a driver accumulates 100 points within two years, he or she will be suspended from driving for three months. Also displayed in Table C1 above are the demerit points allocated to each speeding offence.

Dingle (1985, cited in Zaal, 1994) indicated that the benefits of a demerit point scheme are:

1 It provides positive feedback for those drivers who rarely speed, and may provide additional motivation to maintain a good driving record.
2 It provides drivers who occasionally commit some form of minor speeding offence with *"the necessary incentive to modify their driving behaviour in order to avoid obtaining further points and risking the chance of receiving a more severe penalty"* (p103).
3 It quickly affects drivers who regularly exceed the speed limit and are regularly caught doing so.

The effectiveness of the demerit point scheme has been demonstrated in a study by Haque (1987, cited in Zaal, 1994) of the scheme in Victoria. Haque found a statistically significant increase in the time between committing a second and third speeding offence, compared to between the first and second speeding offence. The results indicated that road users were modifying their behaviour as the threat of more severe penalties increased.

Licence Suspension

Licence suspensions are typically given to repeat speed offenders and those drivers who commit more serious speeding violations (Zaal, 1994). In New Zealand, licence suspension occurs for drivers who receive 100 demerit points within two years or who are apprehended for exceeding the speed limit by more than 50 kph. Drivers who exceed the speed limit by more than 50 kph receive an immediate suspension of their licence for a 28-day period. If the driver attempts to drive during these 28 days and is detected by the police, his or her vehicle is impounded.

Licence suspension has three main advantages (Zaal, 1994). First, it deprives drivers of the ability to drive lawfully. Second, it deters drivers who commit serious speeding offences, or who regularly speed, from speeding. Third, since drivers who have received a licence suspension are not permitted to drive, it reduces the number of high-risk drivers in the traffic stream. Several studies have found, however, that some suspended drivers do drive during their period of licence suspension (Duncan et al, 1990, cited in Zaal, 1994).

Evidence that licence suspension deters speeding was provided by Berland et al (1989, cited in Zaal, 1994). They compared the speeding offence records of drivers who had in the past received a period of licence disqualification compared to a control group who had received a fixed fine. The researchers reported that the licence disqualification group had 38% fewer subsequent speeding offences than the control group. A follow-up survey found that 65% of the drivers who had been disqualified had modified their speeding behaviour in some way as a result of the licence disqualification, compared to only 24% of the control group.

Comparison of Speeding Penalties with Drink-Driving Penalties

In Part A, we reported Kloeden et al's (1997) study. The study demonstrated that the risk of involvement in a casualty crash when travelling at 70 kph in a 60-kph speed-limit zone in Adelaide was similar to that for a blood alcohol concentration (BAC) of 80 mg/100 ml (the legal limit in New Zealand). Kloeden et al reported that, despite the similarity in risk, the penalties for these two offences in South Australia are very different. For example, a driver without previous drink-driving convictions who is caught driving with a BAC between 80 and 149 mg/100 ml receives a A$500 to A$900 fine and has their licence suspended for six or more months. By contrast, a driver travelling at between 61 and 74 kph in a 60-kph zone receives a fine of A$110.

In New Zealand, there are even larger differences between the base penalties for speeding and drink-driving (see Table C2). A driver apprehended with an excess blood or breath alcohol level will appear in court. If convicted, the maximum penalty is a three-month prison sentence or a $4,500 fine, and mandatory licence disqualification for at least six months (except in special circumstances). A third or

subsequent excess blood or breath alcohol conviction results in a maximum penalty of a six-month prison sentence or a $6,000 fine, and mandatory licence disqualification for at least one year (except in special circumstances).

Despite the similar relative risk of crashing, and injuring or killing themselves or someone else, the driver travelling at 70 kph in a 60-kph zone will receive a roadside ticket, or a ticket will be sent to the owner of the vehicle through the Police Infringement Bureau. The fine for exceeding the speed limit by up to 10 kph[45] is $30 (see Table C1). A speeding driver apprehended by the police will receive 10 demerit points, and needs to accumulate 100 demerit points before the driver's licence is suspended for three months. A speeding driver apprehended through use of a speed camera does not receive any demerit points.

Conclusions

- Legal sanctions such as fines, demerit points and licence suspension increase the effectiveness of enforcement by their presence, when they are sufficiently large.
- There is, however, a disparity in the severity of the punishment for speeding and for drink-driving, when the risks of crash involvement are similar.

	Base Offence	Relative Risk for Offence*	Penalty
Drink-driving	Exceeding 80 mg/100 ml blood alcohol concentration (if 20 years or older)	3.2#	• maximum 3 months prison or $4,500 fine (maximum 6 months prison or $6,000 fine for third or subsequent offence) and • 6 months licence disqualification (12 months for third or subsequent offence), except in special circumstances
Speeding	Travelling 70 kph in a 60-kph zone (speed limit exceeded by not more than 10 kph)	4.2	• fine of $30 and • 10 demerit points (unless a speed camera offence) • 100 demerit points in 2 years results in a 3-month licence suspension

Table C2 – Comparison of penalties for similar drink-driving and speeding offences in New Zealand, for a similar relative risk of involvement in a casualty crash

Sources: LTSA (1999b), Kloeden et al (1997).
Notes: *Relative risk of BAC is compared to zero; for speeds, it is relative to travelling 60 kph in a 60-kph zone (from Kloeden et al, 1997). #Relative risk is for all drivers, not separated by age.

45 The fine for exceeding the speed limit by 10 kph is the same regardless of the speed-limit zone. For example, despite the different crash and injury risk, a driver travelling at 110 kph in a 100-kph zone will receive the same fine as a driver travelling 60 kph in a 50-kph zone.

Part D

Time, Fuel, Environment

The previous Parts of this review have discussed the "costs" of excessive vehicle speed in terms of the resultant increase in crash risk and injury severity. In this Part, other costs of vehicle speed will be discussed, such as increased fuel use and the effect on the environment. A perceived benefit of increased vehicle speed – decreased travel time – will also be discussed.

By deliberately looking beyond the central safety issue, it is recognised that the speed at which we drive on our roads is linked directly with other factors, wider costs, and benefits. Particularly in the area of travel time, the discussion soon reduces to the trade-off between using motor vehicles to increase our mobility and our interaction with the world, and restricting that mobility in order to manage the associated risks[46].

If we see our possible responses to this trade-off as positions along a continuum, at one end is the suggestion that we reduce the speeds of motor vehicles to a walking pace, or even slower – however, this would entirely defeat the useful purpose of the available technology. At the other end of the continuum is the proposition that we remove all design and human restrictions on speed and let motor vehicles travel as fast as they can and their drivers wish. From our current position on that continuum, one of the questions to consider is the extent to which we are prepared to restrict mobility and speed in order to reduce the toll of injury and death from excess and inappropriate speed. A discussion of travel time is important in this context.

There are also wider benefits and costs in environmental terms associated with the speed at which we drive. Fuel consumption, particularly in terms of the dollar cost associated with high speeds, and vehicle emissions are distinct issues on their own. Together with travel time, these issues provide a perspective on speed as a general road transport issue, not just an issue to do with our safety on the road.

1: Travel Time

The time available to travel a specified distance often influences a driver's choice of speed. It is usually assumed that the faster the speed, the less time the journey takes. However, this is not always true; for example, the increased crash risk at high speeds increases the probability that the journey will not be completed. Also, in urban environments, where the motorist must frequently stop or slow down for controls at intersections (traffic lights, stop and give-way signs, roundabouts, etc), for pedestrians, and for other disruptions, a faster speed may not necessarily lead to a shorter journey. In general, though, in rural environments, where travel speed can be more constant, the travel speed does affect travel time.

As discussed in Part A, the National Maximum Speed Limit (NMSL) was introduced in the USA in 1974 for all highways (rural roads) and was set at 55 mph at that time. The TRB (1984) compared data gathered (in 1982) after this change came into effect with data from 1973, before the NMSL existed (when states set their own speed limits, which tended to be higher than 55 mph). The TRB calculated the extra time spent travelling on highways in 1982 compared to the time taken for the same travel given pre-1974 speed limits. They found that motorists spent 1 billion extra hours travelling the same distance under the 1982 mean speed than the 1973 mean speed.

The majority of the increased travel time calculated by the TRB (1984) was by passengers in personal vehicles[47]. Since most personal travel trips are short, the increased travel time for each trip was small, but, when the data from across the entire USA were added together, these small increases in travel time led to a large overall increase. There is, however, a great deal of debate about whether it is appropriate or meaningful to add such small increments in time (Ward, Robertson, and Allsop, 1998). For example, adding the travel time increases of 3,600 different road users, where each road user's travel time increase is one second, gives one hour of extra travel time overall. A problem with the approach, then,

46 Restricting mobility is only one way of reducing crashes. An alternative is to maintain mobility and reduce an individual's risk of crashing.

47 It is very difficult to determine the cost of "private" travel.

is whether one second is a significant or meaningful increase in travel time for each individual road user. An individual's tasks or activities will generally not be affected by travel time increases – or decreases – of this magnitude. For example, the shopping time of a road user travelling to town to shop will not be noticeably reduced by an additional few seconds of travel. Or, if a road user's travel time was decreased by a few seconds, this would not usually allow him or her to complete a task he or she would not normally have done, such as mowing the lawns. Since small increments in travel time are relatively insignificant, in some countries in Europe these small increases in travel time are disregarded when calculating a nationwide travel time increase (Ward et al, 1998). That is, travel time increases below a certain threshold are disregarded in determining the increased travel time due to lower speeds.

Speed limit changes affect travel times through changes in mean speed. However, travel time is more dependent on congestion and roadway geometry than on speed limits. In the USA, the 55-mph NMSL had a greater travel time effect on roads with low congestion and good geometry, such as rural interstate highways, than on more congested roads, such as rural collectors. Similarly, congestion played a larger part than the speed limit change on travel time for commuter drivers in peak-hour traffic (TRB, 1994).

In general, the main road user group who had their travel time affected by the 55-mph speed limit change were passenger vehicles, although their short trip distances meant the effect was not large (TRB, 1994). In comparison, commercial truckers, who have long trip distances, did have their travel time adversely affected. However, the lower speed limit also had major benefits for commercial truckers, such as lower fuel and maintenance costs.

Overall, the effect of reduced speed limits in the USA had some effect on motorists' travel time. However, the relationship between speed limits and travel time is not straightforward. For example, travel speed is dependent on road type and congestion. Furthermore, the road user is generally only affected by a small increase in travel time (see Table D1), particularly since the majority of trips are short. For example, the New Zealand Household Travel Survey, conducted between July 1989 and July 1990, found that only 7.7% of trips made in light four-wheeled vehicles were over 20 kilometres in length (Ministry of Transport, 1990). Similarly, a study in Germany found that 80% of journeys are shorter than 10 kilometres (Kloas, 1993, cited in Robertson and Ward, 1998). Furthermore, even when the trip distance is relatively large, the travel time savings from increased speed are small. For example, a driver travelling consistently at 120 kph for 100 kilometres compared to another driver travelling at 100 kph for 100 kilometres would save only 10 minutes[48]. In reality, it is very difficult in New Zealand to travel consistently at 100 kph or higher for 100 kilometres, given road type and other traffic; therefore the actual difference between these two hypothetical drivers is likely to be even smaller.

Original Speed (kph)	50	70	90	110	130
Reduced Speed (kph)	45	65	85	105	125
Extra Travel Time (minutes:seconds)	1:20	0:40	0:23	0:16	0:11

Table D1 – Extra travel time on a journey of 10 km when average speed is reduced by 5 kph

Source: Adapted from ETSC (1995).

The example given above of saving 10 minutes travel time by travelling at 120 kph instead of 100 kph over a 100-kilometre journey raises the philosophical question of whether mobility should be traded for safety. For example, is the increased risk of crashing acceptable in the interests of saving 10 minutes travelling time? Or, in an urban environment, is the increased risk of killing a pedestrian acceptable in the interests of saving time?

In areas of transport outside the road environment, the transport user never considers mobility more important than safety. For example, in air travel the safety of the aircraft before it leaves the ground is given top priority – the time spent waiting on the ground for safety reasons is fully accepted by passengers. In contrast, in the road transport system, health losses from crashes *"are major, but to some extent acceptable,*

48 A driver travelling at 120 kph for 100 kilometres would take 0.83 of an hour (100 km divided by 120 kph), or 50 minutes, to complete the journey. In comparison, a driver travelling at 100 kph would take one hour (100 km divided by 100 kph).

consequences of mobility" (Tingvall, 1999, p1). Sweden has recently taken the important step of not tolerating such a philosophy in road transport. In October 1997, the Swedish parliament developed their "Vision Zero" strategy, which envisions moving to a transport system that is designed so that fatalities, and injuries where the victim does not recover, do not occur. "*This means that safety is more important… than other issues in the road transport system (except for health related environmental issues)*" (Tingvall, 1999, p4) and that mobility must always come second to road safety.

One means offered for implementing Vision Zero is to lower speed limits so that they do not exceed the capacity of the human body to survive a crash (see Part A). For example, speed limits on undivided lanes outside built-up areas could be reduced to 70 kph (Tingvall, 1999). Another possible means of implementing the strategy is to reconstruct road environments (for example, by dividing roads or adding effective roadside barriers) so that severe crashes do not occur, but still allow travel speeds between 90 and 110 kph.

In spite of whether increased travel time is perceived as an advantage or disadvantage, the European Transport Safety Council (ETSC, 1995) summarises the effects of speed on travel time by stating that the overall costs – such as increased crash risk and injury severity, as well as fuel and environment costs (discussed below) – of an increase in speed above appropriate levels clearly outweigh any advantage of decreases in journey times.

Conclusions

- As vehicle speed increases, travel time tends to decrease somewhat, although this also increases crash and injury risks.
- Trips in passenger vehicles are less affected by increased travel time because they tend to be short trips, and the total increase in travel time tends not to be substantial.
- Long haul freight operators are more affected by increased travel time, but lower speeds also provide fuel and maintenance savings for operators.
- Reducing the travel speed of a 10-kilometre trip from 90 to 85 kph increases travel time by only 23 seconds.

2: Fuel Use and Other Vehicle Operating Costs

The relationship between fuel use and vehicle speed has been well known for some time. For example, in response to the oil crisis of the early 1970s, New Zealand imposed an open-road speed limit of 50 mph (80 kph) in December 1973 as a fuel-saving measure. Similarly, in 1974, the USA imposed the 55-mph (89-kph) NMSL to conserve oil.

Several studies have been conducted to estimate the reduction in fuel consumption after a reduction in vehicle speed. For example, the European Conference of Ministers of Transport (ECMT, 1996) reported that the results of several German studies have estimated that, *"for a car fleet of the type found in Germany, a reduction of x percent in average driving speeds on rural road networks can reduce fuel consumption by 0.8 [times] x percent"* (p17).

In France, it has been estimated that, if the speed limits were strictly complied with, there would be a saving of 350,000 tonnes (1.4%) of oil out of the 25 million tonnes consumed annually by car drivers (ECMT, 1996). In the Netherlands, when speeds on motorways with a 100-kph speed limit were heavily enforced so that mean speeds fell from 111 to 104 kph, there was a saving of 40 million litres of petrol and 40 million litres of LPG (ECMT, 1996).

A study in the USA calculated the effect on fuel use when steady driving speeds increased from 55 mph (89 kph) to 70 mph (113 kph). The result was a 17% increase in fuel consumption (ECMT, 1996). In New Zealand in 1996, it was estimated that an increase in speed limits from 100 to 110 kph would increase fuel consumption by around 10% (Waring, 1996).

The reason for the changes in fuel consumption at different vehicle speeds is due to variation in the fuel efficiency of the vehicle. Recently, West et al (1997, cited in TRB, 1998) examined the relationship between fuel efficiency and driving speed of a small sample of 1988 to 1995 model automobiles

and light duty trucks[49]. Figure D1 below shows the results. Fuel efficiency was shown to peak at about 55 mph (89 kph). The drop in fuel efficiency after 55 mph is due primarily to the effect of aerodynamic drag (that is, the engine has to work harder to account for this). The low fuel efficiency at low speeds occurs because of engine friction, tyres, and accessories (such as power steering)[50] (TRB, 1995, cited in TRB, 1998).

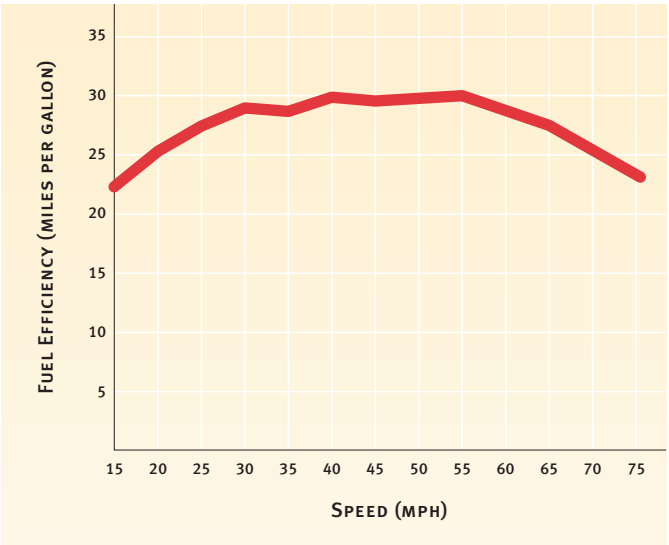


Figure D1 – Fuel efficiency as a function of speed – model year 1988-1995, automobiles and light-duty trucks

Source: Davis (1997, p3-51, cited in TRB, 1998, p69).
Note: 1 mph = 1.609 kph; 1 gal = 3.8 L.

For heavy duty diesel trucks, fuel efficiency tends to decline sharply at speeds above 50 mph (80 kph) (TRB, 1995, cited in TRB, 1998). The decline is largely due to aerodynamic drag. Fuel efficiency also tends to be poorer for sport utility vehicles, mini-vans, and pick-up trucks (TRB, 1998). Aside from fuel efficiency, tyre wear tends to increase with increasing speed (TRB, 1998). However, the cost is minor compared to the increased fuel cost with increased speed.

Overall, the relationship between increased vehicle speed and increased fuel use is well known. As the mean speed on the open road decreases, fuel efficiency also improves. The following section looks at the effect on the environment of decreasing fuel consumption.

Conclusions

- At high vehicle speeds, fuel use increases due to poorer fuel efficiency of the vehicle.
- Fuel efficiency has been estimated to peak at 89 kph for cars and light trucks and at 80 kph for heavy diesel trucks.

49 The vehicles were examined under steady-state cruise type driving conditions. (Note that it is very difficult to measure fuel efficiency.)

50 Energy is required to overcome air resistance, tyre rolling resistance, and the power taken to drive such accessories as the cooling fan, the alternator, the fuel and oil pumps, etc. The energy required does not increase linearly with speed, but as some power of the speed. These energy losses require the expenditure of fuel other than in just moving the vehicle, and thus cause fuel efficiency to be low at low speeds and also to reduce as speed increases above a certain level (55 mph in Figure D1).

3: Environment

"A clear link exists between high vehicle speeds and the volume of gaseous emissions from vehicles" (ECMT, 1996, p17). The major pollutants from vehicles are carbon monoxide (CO), hydrocarbons (HC), oxides of nitrogen (NO_X)[51], and particulates[52] (Ward et al, 1998). These pollutants are produced in different quantities at different speeds.

Several models have been developed to describe the interaction between different emissions at different speeds. Figure D2 gives an example application of the model VETO, which demonstrates *"how the estimated levels of emissions vary with speed for a stream of vehicles (85% cars, 10% heavy lorries [that is, trucks], and 5% medium lorries) at steady speeds between 30 and 90 kph on flat roads"* (Hammarström and Karlsson, 1987, cited in Ward et al, 1998, p4). Figure D2 indicates that fuel use and emissions of both CO and NO_X are minimised at 40 kph, whereas particulate emissions are minimised at 50 kph and HC emissions at approximately 70 kph. As speed increases above 50 kph, the level of emissions of CO, NO_X, and particulates increases.

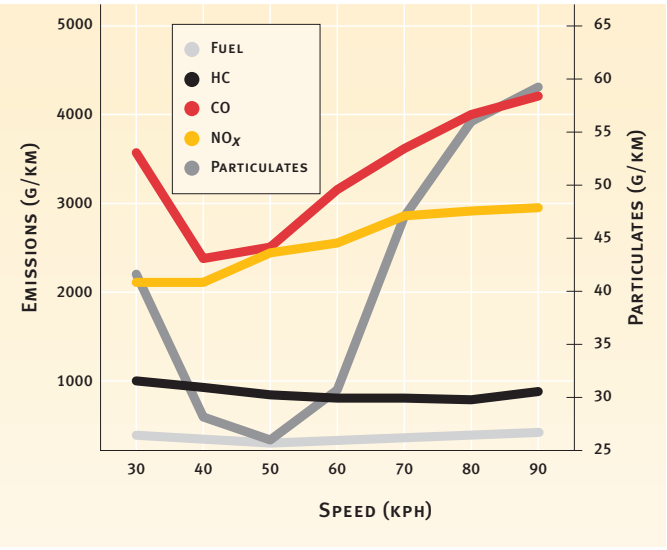


Figure D2 – Gaseous emissions as a function of speed

Source: Ward et al (1998, p5).
Notes: Data based on 2,000 vehicles per day, of which 15% are trucks and 80% use catalysts. "g/km" = grams per kilometre.

Emissions also vary under different conditions. Emissions increase greatly when the engine is cold (Ward et al, 1998), and emissions such as CO and Volatile Organic Compounds (VOCs) are very high in heavily congested stop-and-go traffic (TRB, 1995, cited in TRB, 1998). Another finding is that harsh acceleration increases vehicle emissions sharply. For example, De Vlieger (1997, cited in Ward et al, 1998) compared the emissions of seven cars in Belgium under "calm", "normal", and "aggressive" driving conditions[53] and found emissions were generally higher during aggressive driving than normal driving.

The substances such as CO and NO_X degrade air quality. Another substance emitted from motor vehicles, which is not toxic but does have other adverse effects, is carbon dioxide (CO_2). CO_2 is a gas that traps heat in the upper atmosphere, thus warming the earth; this global warming, principally as a result of CO_2 emissions, is known as the Greenhouse Effect. CO_2 is produced in proportion to fuel consumption. Unfortunately, motor vehicles are the largest source of CO_2 emissions in New Zealand and the USA, and these emissions are highest at high speeds as a result of the poorer fuel efficiency at high speeds[54]. The TRB (1997, cited in TRB, 1998) claimed that, *"in 1994, motor vehicles accounted for about one-quarter of all US CO_2 emissions. The United States, in turn, is the largest emitter of CO_2, accounting for one-quarter of global emissions"* (p71). In New Zealand in 1997, domestic transport accounted for 40.3% of the 28 million tonnes of CO_2 produced (Ministry of Commerce, 1998).

A small number of studies have examined the relationship between changes in speed limits or mean speeds, and vehicle emissions. When the speed limit was lowered from 130 to 100 kph in Austria, there was a 17% reduction in NO_X emissions and a 25% reduction in CO_2 emissions (ECMT, 1996). Similarly, when the mean speeds on motorways in the Netherlands decreased from 111 to 104 kph, CO_2 emissions decreased by 34% and NO_X emissions by five percent.

Gaseous emissions are controlled by vehicle catalysts. Vehicle catalysts are substances that promote (speed up) chemical changes in exhaust gases without being changed in any way themselves[55]. Unfortunately, the catalysts are generally only tested in urban environments; hence their effectiveness at high speeds is unknown. Furthermore, the

51 CO is a poisonous gas, HC causes photochemical smog, and NO_X causes acid rain.

52 Particulates are substances emerging from the exhaust that are solids, not gases. From diesel engines, they are largely particles of carbon resulting from incomplete combustion of the fuel. From petrol engines, they are carbon particles and also metals and metal compounds resulting from combustion of fuel and lubricating oil. The dangerous particles are those less than two microns in size, though sub-10-micron particles are also considered undesirable. The danger to health comes from (a) the carcinogens trapped on their surfaces, particularly from diesel fuel combustion, and (b) the inability of the lungs to clear sub-two-micron particles from deep in the lungs, so that carcinogenic chemicals remain in contact with the tissues for long periods of time.

53 "Calm driving" was anticipating movements of other drivers. "Normal driving" had moderate acceleration and braking. "Aggressive driving" was sudden acceleration and heavy braking.

catalysts are not effective when the vehicle is cold[56]. Since the majority of trips in New Zealand are short, the catalyst is unlikely to be effective because the vehicle remains cold for the duration of the journey.

Another environmental effect of speed is noise. Traffic noise is produced by two main sources: the power unit of vehicles and the interaction between vehicle tyres and the road (Ward et al, 1998). Figure D3 demonstrates the general relationship between vehicle speed and the noise from these two main sources. As shown in Figure D3, the noise from the tyre-road interaction increases with increasing speed, whereas the power unit noise remains reasonably constant across speeds. In new cars, the noise from the tyre-road interaction dominates the noise from the power unit of the vehicle above the speed range 20 to 40 kph. For new trucks, this occurs between 30 and 60 kph, whereas for older vehicles the tyre-road noise dominates at about 10 kph higher, due to the higher power unit noise (Ward et al, 1998). Overall, though, vehicle noise increases with increasing speed.

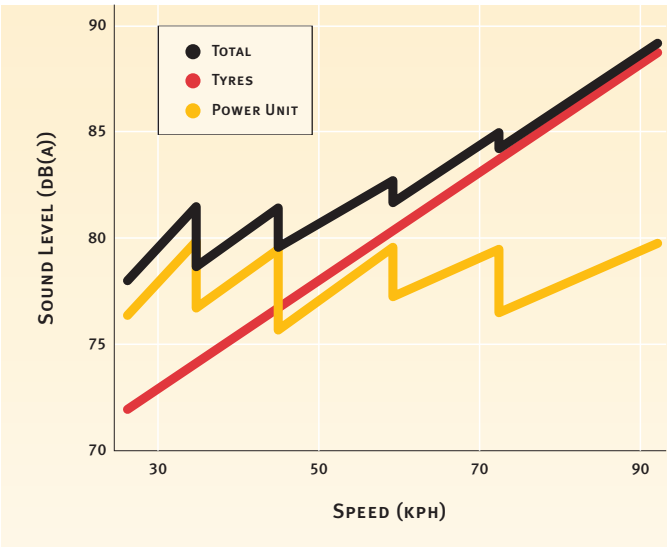


Figure D3 – Effect of speed on noise produced by a vehicle

Source: Ward et al (1998, p7).
Note: "dB(A)" stands for A-weighted decibel, which is the normal measurement of human response to traffic noise.

The relationship between noise and speed limits was examined on a German autobahn when the speed limit was reduced from 100 to 80 kph. The noise level for those living near the autobahn reduced by 3.9 dB (decibels) following the speed limit change (ECMT, 1996, p17).

Conclusions

- As speed increases above 50 kph, the level of emissions of CO, NO_X, and particulates increases.
- At low speeds in congested traffic, gaseous emissions such as VOCs and CO are high.
- At high speeds, emissions of CO_2 are high, which contributes to the Greenhouse Effect. Motor vehicles are the largest source of CO_2 emissions in New Zealand.
- Reducing the mean speed of vehicles reduces the level of gaseous emissions.
- Vehicle noise increases with increasing speed due to noise from the tyre-road interaction.

54 Carbon dioxide emissions are linearly proportional to the fuel used – about 3.7 kilograms of carbon dioxide is produced for every kilogram of fuel used. As explained in footnote 50, more fuel is used to cover a given distance at high speed than at low speed, primarily due to increased wind resistance, but also because of increased tyre rolling resistance and unnecessary extra power used by accessories.

55 What is needed is rapid oxidation of unburned hydrocarbons and carbon monoxide, to carbon dioxide and water, and rapid reduction of oxides of nitrogen to nitrogen and oxygen. Typically, the only catalysts that meet the requirements are mixtures of rare (and costly) metals (such as platinum, palladium, rhodium, and so on). Platinum is the best, usually, because it starts working at a lower temperature than the others. The metal is distributed (as thinly as possible) on a ceramic substrate, which provides the largest possible surface in contact with the exhaust gas.

56 Generally, catalysts only start to work at upwards of 250 degrees Celsius. The average New Zealand car trip is not long enough to heat the catalyst up so that it starts to work. Hence, putting catalysts on every car will not solve our pollution problems until pre-heated catalysts are available.

Part E

New Zealand and the Speeding Problem

Speeding lies at the core of the road safety problem throughout the motorised world. This is because, as we have seen, excess and inappropriate vehicle speed increases the risk of crashes, and increases the severity of injuries resulting from crashes, regardless of whether speed was a contributing factor in the crash. These risks are not peculiar to New Zealand, and so, to better understand these risks, and the measures available to reduce them, the analysis so far has been undertaken from a predominantly international perspective.

The speeding problem in New Zealand has some unique aspects. Our geography, our weather, our roadside environment, our spread of population – all are factors in our roading network that make our speeding problem unique to New Zealand. In a more fundamental sense, however, the speed problem in New Zealand is anything but unique, because of the consistent way in which speed impacts on safety. New Zealand conditions compound the problem, but they are not the problem in themselves. We do not have interstates or autobahns as they do in the USA and Germany, and we do not have a large proportion of flat, straight roads as they do in Australia. The first section of Part E looks at features of our roading environment and associated crash statistics.

We need to better adapt to our roading environment by reducing our speed. If we do not reduce travel speed generally in New Zealand, the injury and death toll will remain the same and will even increase with a growing population, growing motor vehicle registrations, and growing traffic volumes.

This Part of this review also examines current New Zealand data related to speeding. As we have seen, speeding both increases the chances of being involved in a crash and increases the chances of being injured or killed in a crash. However, the effect of excess or inappropriate speed on crashes cannot always be "captured", because speed may not be identified as the main cause of the crash. For example, if a motorist is faced with an oncoming vehicle on the wrong side of the road, his or her travel speed may make the difference between avoiding the vehicle and crashing, between suffering severe injuries and not being injured at all, or between suffering a fatality and living to tell the tale. What we can capture is how New Zealanders perceive speeding as a safety issue.

As a community, there is a slow dawning of understanding emerging about the effects of speeding. However, twice as many New Zealanders still believe they can drive safely while speeding, as believe they can drive safely after drinking alcohol. We can and must do more to change New Zealanders' attitudes towards speed and reduce the impact of vehicle speed on our lives.

1: The Impact of New Zealand Conditions on Vehicle Speed

In New Zealand, there are about 92,000 kilometres of road, over 2.3 million vehicles, and over two million licensed drivers. A breakdown of the network by road type is shown in Table E1. Vehicle ownership levels are second only to the USA. With a wide spread of metropolitan and provincial cities, there are high volumes of inter-regional traffic north of Taupo and north of Wellington. Some major two-lane, two-way roads in Auckland, the Waikato, and the Bay of Plenty frequently approach or exceed capacity, and this over-capacity relative to the state of the roading network is contributing to the road toll, with little likelihood of major relief in the immediate future. Achievement of improved road safety performance will require a major capital works programme to improve road design by increasing the length of divided highways and improving the overall standard of other roads. However, even if such a programme started tomorrow, it would take some years before the changes had a major impact on the road toll. In the meantime, it is necessary to look at additional ways of improving the safety of the roading infrastructure, such as applying black spot treatments and using any of the other road and traffic design features listed in Part B. Most importantly, New Zealand drivers must drive safely by avoiding speeds that are excessive or inappropriate for the road conditions. This section looks at New Zealand's different road conditions and their relationships with crash rates.

Road Type

The New Zealand roading system is made up of six major road types (see Table E1). The motorways and divided state highways are based around the major cities, particularly Auckland. The other open roads – mostly two-lane, two-way roads – are spread throughout the country. The risk of head-on crashes is increased on roads such as these, because drivers may cross the centre line on a road (for example, by swinging wide on a bend) and crash into an oncoming vehicle. The severity of the crash is dependent on the speeds of the vehicles involved. In 1998, approximately 27% of fatal crashes on rural roads involved head-on collisions (see Figure E1).

Road Type	Length (in kilometres)*	Approximate Percentage of Total Road Length
Motorway	335	0.3
Divided state highway	61	0.1
Other state highway	10,005	10.1
Other open road	73,271	73.9
Major urban	5,519	5.6
Minor urban	10,019	10.1

Table E1 – Length of New Zealand roads by road type

Source: LTSA Crash Analysis System.
Note: *The lengths of road are calculated from vectors in the Crash Analysis System. On dual carriageways, there are parallel vectors, hence the length on both sides of the road is counted. This approach means the total of the lengths of road given above is slightly higher than the actual total of 92,000 km of road in New Zealand.

In addition to increasing the risk of head-on crashes caused by a driver inadvertently crossing the centre line, two-lane, two-way roads also increase the risk of overtaking crashes, in which a driver has deliberately crossed the centre line. On these two-lane, two-way roads, drivers are often slowed by vehicles travelling in front of them at a slower speed. When this occurs, the driver who wants to travel faster than the vehicle in front may attempt to overtake that vehicle by crossing into the lane used by the oncoming traffic. Because of the nature of our roading system, therefore, a high number of overtaking manoeuvres are undertaken on New Zealand roads. In general, overtaking vehicles have to travel at high speeds during the manoeuvre, and this fact increases both the risk of a crash and the crash severity. In 1998, in approximately six percent of the fatal crashes and two percent of the injury crashes, the driver action of overtaking was identified as a factor contributing to the crash[57] (see Figure E2).

57 For these statistics, the driver action of overtaking includes changing lanes on multiple lane roads as well as overtaking on two-way, two-lane roads.

The overtaking and head-on crash rate could be reduced significantly if New Zealand could afford to upgrade main roads that are not already divided to four lanes (two lanes each way), with the addition of a median divider. Also, the provision of suitable passing opportunities is a significant countermeasure in reducing overtaking crashes. Transit New Zealand has a policy for passing lanes that is currently being examined by two research projects, which indicates the importance placed on this area. Another approach to reducing overtaking crashes is to reduce the number of drivers travelling at excess speed. That is, if these drivers travel at a lower speed, their need to overtake other vehicles would be reduced.

Urban environments consist of major roads, such as arterials, and minor roads, such as residential streets. Some arterial routes travel through residential areas, which contain a large number of access points, such as driveways. Because of this, on some arterial roads there is a high risk of crashes involving children running onto the road or vehicles entering or exiting the road via a driveway. From 1996 to 1998, for example, there was an average of 10 fatal crashes and 460 injury crashes per year involving a vehicle entering or exiting a driveway in an urban area (including pedestrian casualties).

Evidence that the number of access points affects the crash rate was demonstrated by Jackett (1992). He conducted an analysis of urban crashes in the areas between intersections, known as "mid-blocks", and found that the crash rate per vehicle-kilometre travelled was higher for residential/industrial mid-blocks, which contain a high number of access points, than for mid-blocks with no development. Access to all main roads should, therefore, be limited as much as possible to reduce the number of potential conflict points.

Basic Statistics on Road Crashes

The following are some basic statistics on road crashes produced annually by the Land Transport Safety Authority (LTSA, 1999c). These statistics give an indication of the types of crashes that occur in New Zealand each year.

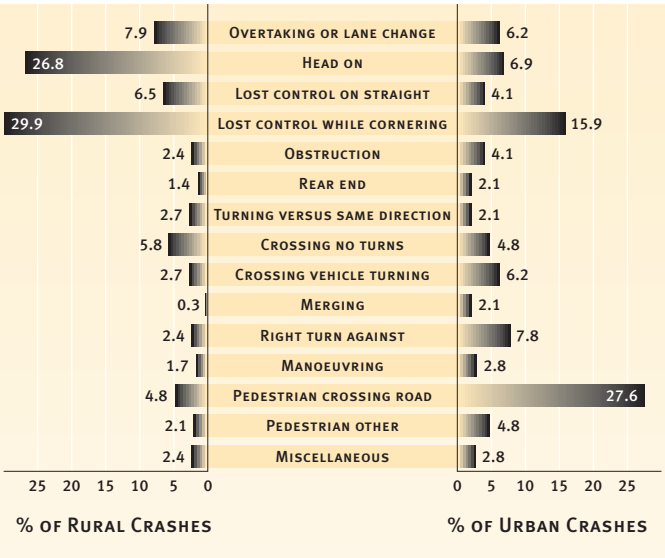


Figure E1 – Movement classification of fatal crashes in 1998

Source: Generated from LTSA (1999c, Tables 16 & 17, p41).
Notes: "Urban" refers to all speed limit areas of 70 kph and under, and to limited speed zones; "Rural" refers to all speed limit areas of over 70 kph.

Figure E1 demonstrates that, in 1998, fatal crashes on rural roads were most likely to involve loss of control while cornering (29.9%) and were almost as likely to involve a head-on collision (26.8%). Loss of control while cornering typically occurs when the driver is travelling too fast for the conditions or is a drink-driver[58]; the same is also often true for the (usually) inadvertent crossing of the centre line that leads to head-on collisions. In urban environments in 1998, fatal crashes were most likely to involve a pedestrian crossing the road (27.6%). This demonstrates that pedestrians are vulnerable even to the lower speeds in urban environments. A smaller but sizeable proportion (15.9%) of the fatal crashes in urban areas involved loss of control while cornering.

Figure E2 shows the factors identified as probably contributing to crashes in 1998, separated according to whether the crash was fatal or involved injury (but no fatality). The figure demonstrates that travelling too fast for the conditions was the factor contributing to the largest proportion of fatal crashes (32%) and was a major contributor to injury crashes (17%).

58 Part of the reason drink-drivers are over-represented in this type of crash is because they make inappropriate decisions about travelling speed.

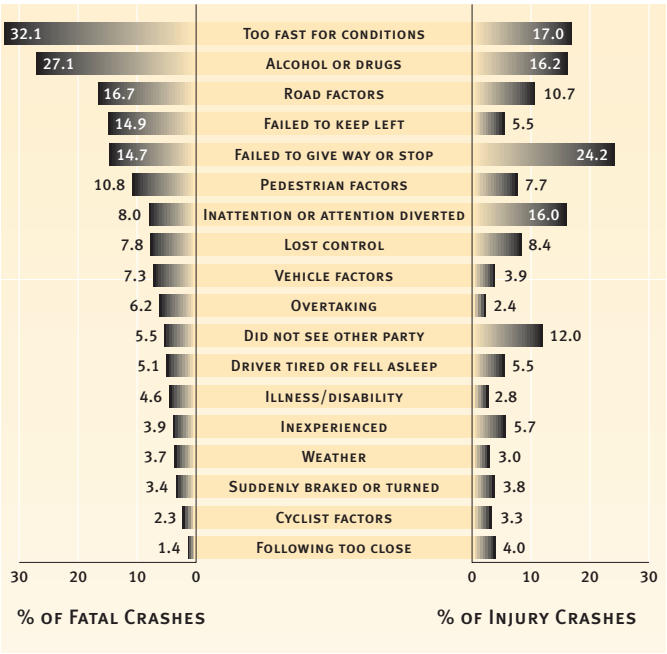


Figure E2 – Factors probably contributing to crashes in 1998

Source: LTSA (1999c, p49).

Design Speed

The design speed of a road is the maximum speed for which the road is designed. It is based on such factors as curvature and sight distance. In New Zealand, a significant proportion of the rural roading network was constructed under a 50-mph/80-kph open-road speed-limit regime. Improvements to some parts of the network have been made since it was constructed, to bring the design speed up to 100 kph. Similar road networks in other developed countries often have speed limits of 80 or 90 kph. Thus, rural roads in New Zealand tend to have much lower design speeds than the speeds at which modern vehicles are capable of travelling and do indeed travel. Unfortunately, with the increased in-vehicle comfort even when travelling at high speeds, there is the temptation for road users to travel at high speeds on roads that appear appropriate for high speeds, when, in fact, such speeds are not appropriate.

The safe travel speed in urban areas generally has as much to do with roadside development and access as with road design.

Roadside Environment

Compared with Australia, for example, New Zealand's rural roadsides are much less forgiving. For instance, there are often ditches[59] on the side of our rural roads, many of which are not easily visible from the road, despite their proximity. A vehicle leaving the road at high speeds would almost certainly enter the ditch, most likely still at close to full speed, causing a serious crash with severe injuries to the vehicle's occupants. In 1998, for instance, 15% of the injury crashes in which an object was struck on rural roads involved a vehicle running into a ditch (see Figure E3).

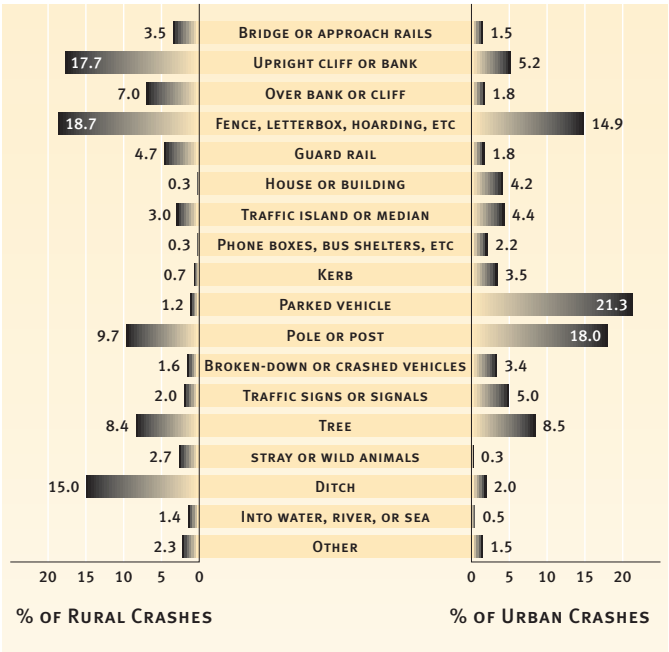


Figure E3 – Objects collided with in injury crashes on rural and urban roads in 1998

Source: Generated from LTSA (1999c, Table 22, p45).
Notes: A crash will appear more than once in this figure if the vehicle(s) involved struck more than one object. The percentages given are as a proportion of only those crashes in which an object (other than a moving vehicle) was struck. "Urban" refers to all speed limit areas of 70 kph and under, and to limited speed zones; "Rural" refers to all speed limit areas of over 70 kph. Fatal crashes are not included in this figure.

Figure E3 demonstrates that, in injury crashes where an object was struck, the following are among those struck most frequently: upright cliffs or banks, fences or letterboxes, poles or posts, and trees[60]. All of these objects are common on New Zealand's roadside, and, as with ditches, the higher the speed at which the object is struck, the more severe the crash consequences. The incidence of striking these objects could be reduced with the addition of "audible edge lines", which let drivers know immediately that they are leaving the road and, hence, allow earlier responses. Also, the road shoulders could be widened to allow more room for vehicles that travel off the carriageway to recover. Another modification that would reduce crashes is the use of hard shoulders rather than gravel, as this would give drivers better control when

59 Usually water races.

60 In fatal crashes in which an object was struck, the most frequently struck objects were the same as for injury crashes.

they leave the road. In 1997 and 1998, there were, on average, 12 fatal crashes and 124 injury crashes per year in which a driver lost control when returning to seal from an unsealed shoulder (LTSA, 1999c).

Of the objects struck in urban environments, parked vehicles are also commonly struck. For example, in 1998, there were nine fatal and 410 injury crashes in which a parked vehicle was struck.

Rural Roading Environment

Rural roads in New Zealand frequently pass through farming areas, such as sheep and dairy farms. This can be a problem if an animal escapes onto the roadway, particularly at night. Crashes with wandering stock tend to be rare, but, when they do occur, there is high potential for death or serious injury. For example, from 1996 to 1998, there were, on average, three fatal crashes and 58 injury crashes per year in which it was identified that a farm animal probably contributed to the crash[61]. High speeds exacerbate this risk, because the driver has less time to react when encountering an animal on the road, the stopping distance will be greater, and the severity of the collision with the animal increases with higher speeds.

Road Geometry

Road geometry includes the horizontal curvature (bends and curves) and vertical curvature (hills and raised sections) of a road. New Zealand roads often pass through mountainous terrain, and these mountain roads tend to be very narrow and windy with steep gradients. The problems associated with these road geometry features are compounded by poor weather conditions, such as rain and ice. To overcome these problems, the entire roading network needs appropriate skid resistance, and the design of the roads needs to be carefully considered to ensure that the curvature and width of the road are appropriate to the geometry of the terrain, typical weather patterns, and traffic volume.

Emergency Services

The population of New Zealand is small and, particularly in rural areas, is spread over a large area. Because of this, the nearest town may be some distance away from a crash site and the time taken for emergency services to attend can sometimes be large. In serious crashes, this increases the chance that crash victims will die from their injuries before the emergency services arrive or that their injuries will worsen to the extent that they will be seriously affected for the rest of their lives. As McVey, Atkin, and Vulcan (1988) stated, "*some injuries are time critical and, although they may be the minority of cases, outcome does relate to the time interval between injury and the commencement of appropriate definitive treatment*" (p51). Brain injuries and injuries involving severe blood loss are examples of injuries for which the time between injury and initial treatment is important. Thus, the response and transportation times for emergency services can be very important in determining the long-term outcome for crash victims.

Conclusions

- Apart from very small lengths of motorway and divided highway, New Zealand's rural road network comprises two-way, two-lane roads, often passing through mountainous country. The risk of head-on crashes on these roads is increased; the severity of these crashes is dependent upon the speed of the vehicles involved.
- The most common types of fatal crashes in New Zealand are those in which a driver has lost control, a situation that is usually associated with excess or inappropriate speed. Overtaking crashes are also associated with excess and inappropriate speed. The most common urban crash involves a pedestrian crossing the road.
- New Zealand's rural roading environment is quite unforgiving, with cliffs, fences or letterboxes, posts, trees, and ditches the most frequently struck objects. Parked vehicles are also commonly struck in urban environments.

61 These statistics refer only to farm animals, not household pets, wild, or other animals. When looking at all animals, in 1996 to 1998 there were, on average, six fatal and 72 injury crashes per year that were identified as probably caused by animals. These animals may not necessarily have been struck in the crash, but were identified as having caused the crash.

2: Data Analysis

Crash Data

The numbers of deaths and reported injuries from road crashes within New Zealand have, generally, declined fairly steadily in recent years (see Table E2). Despite the decline, the numbers of deaths and injuries on New Zealand roads – and the associated social cost[62] of these – are very high. In 1998, the social cost of fatal and reported injury crashes was approximately $2.77 billion (costed at 1999 prices).

Excess or inappropriate speed is a major contributing factor in road crashes (see Table E2). For example, in 1998, it probably contributed to 32% of fatal crashes and 20% of injury crashes. However, it is often difficult to determine if speed was a factor in a crash – it is rare for a driver to admit he or she was speeding. This means that the identification of speed as a factor in a crash often depends on physical and/or witness evidence, and this may be inconclusive or unavailable. In general, speed is identified as a contributing factor in a crash if:

- either the police officer attending the crash reports that the driver was travelling at excess or inappropriate speed, and the Land Transport Safety Authority, whose staff code crash reports, agree with the officer and code the report with the factor "travelling too fast for the conditions";
- or the Land Transport Safety Authority staff who code crash reports determine from the evidence in the crash report, and based on their experience, that speed probably contributed to the crash.

Overall, it is assumed that speed is under-reported in data on crash factors because of the difficulty identifying it. That is, it is assumed that there are a substantial number of crashes in which excess or inappropriate speed was a contributing factor but which could not be identified as speed-

	1995	1996	1997	1998
Deaths				
Total road deaths	582	515	539	502
Deaths from crashes where speed was a factor	221	177	162	162
Percentage of total road deaths where speed was a factor	38.0	34.4	30.1	32.2
Serious Injuries				
Total reported serious injuries	3,153	2,939	2,613	2,400
Reported serious injuries where speed was a factor	670	645	608	539
Percentage of total reported serious injuries where speed was a factor	21.2	21.9	23.3	22.5
Minor Injuries				
Total reported minor injuries	13,717	11,857	10,764	10,012
Reported minor injuries where speed was a factor	2,318	2,161	1,917	1,896
Percentage of total reported minor injuries where speed was a factor	16.9	18.2	17.8	18.9

Table E2 – Casualties from all road crashes and where excess or inappropriate speed was identified as a contributing factor, 1995-1998

Source: LTSA Crash Analysis System.

62 "Social cost" includes all loss of life and life quality, medical treatment, related enforcement, and property damage. The cost of loss of life and life quality is the amount people are willing to pay to avoid the risk of death or injury from motor vehicle crashes.

related crashes. Furthermore, it is expected that there are a substantial number of crashes that are not coded as involving excess or inappropriate speed, but for which the injuries sustained in the crash would have been considerably less had the vehicle(s) involved been travelling at a lower speed.

Despite the limitations of the speed data, Table E2 demonstrates that, over the years 1995 to 1998, the number of injuries from crashes in which excess or inappropriate speed was identified as a contributing factor has declined slightly. However, the number is still very high and represents a significant proportion of the road toll.

The majority of deaths from crashes involving excess or inappropriate speed occur on rural roads. For example, 68% of the deaths from crashes involving speed in 1998 occurred on rural roads (see Table E3), whereas the minor injuries from crashes involving excess or inappropriate speed were approximately equally likely to occur on urban or rural roads. A similar proportion of rural to urban casualties occurs for crashes in which speed was not identified as a contributing factor. The higher speeds on rural roads are part of the reason there are more people killed on these roads. As we discussed in Part A of this review, this is because the higher the speed of a vehicle involved in a crash, the greater the injury severity for the vehicle occupants.

	Rural	Urban	% Rural
Crashes without Speed as a Factor			
Deaths	240	100	71
Reported serious injuries	958	903	52
Reported minor injuries	3,128	4,988	39
Crashes with Speed as a Factor			
Deaths	110	52	68
Reported serious injuries	326	213	60
Reported minor injuries	991	905	52

Table E3 – Casualties from rural and urban crashes with and without excess or inappropriate speed identified as a contributing factor, 1998

Source: LTSA Crash Analysis System.
Notes: "Urban" refers to all speed limit areas of 70 kph and under, and to limited speed zones; "Rural" refers to all speed limit areas of over 70 kph. The data refer to the number of casualties, not the number of crashes.

The proportion of all road deaths that occur outside urban areas (that is, in rural areas) in New Zealand is particularly high internationally. For example, 73% of the road crash deaths in New Zealand in 1997 occurred outside urban areas (Figure E4). Only in Norway, Spain, Austria, and Germany did a higher proportion (up to 80%) of deaths from road crashes occur outside urban areas in 1997. By comparison, in Japan, Poland, and Iceland, only just over 50% of road fatalities occurred outside urban areas.

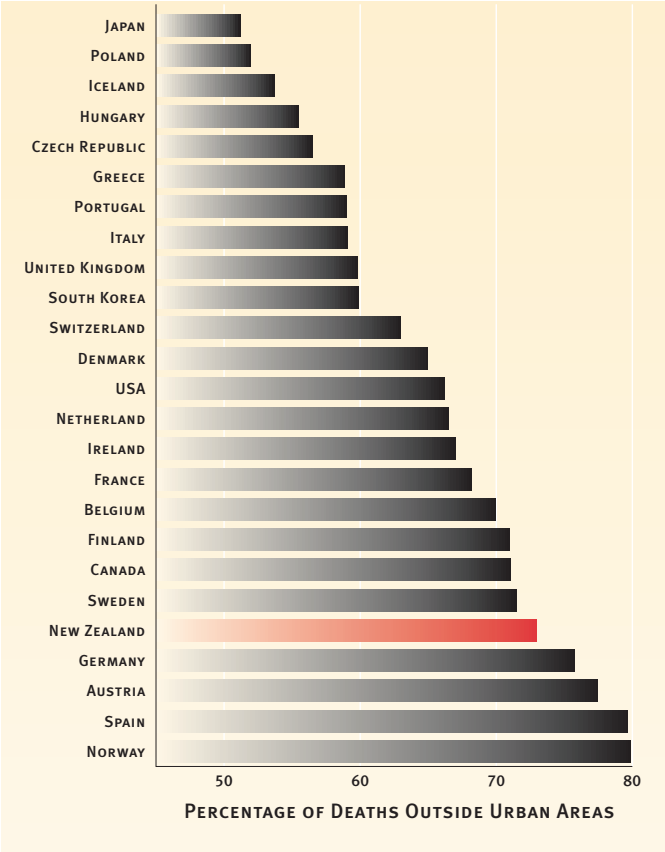


Figure E4 – International comparison of percentage of road deaths that occur outside urban areas

Source: LTSA (1999c, Table 7, p157).

It is important to note that in urban environments there are high numbers of vulnerable road users, such as pedestrians. Therefore, despite the lower speed in urban environments, these vulnerable road users have a high likelihood of being killed if hit by a vehicle. From 1996 to 1998, there were 132 pedestrians killed in crashes with a motor vehicle in urban areas. Of these 132 pedestrians, 13 were killed in crashes in which excessive speed was identified as a contributing factor (Table E4).

Road User Killed	Rural	Urban	Total
Speeding driver*	165	52	217
Passenger with speeding driver*	111	48	159
Speeding motorcycle rider	32	25	57
Pillion with speeding motorcycle rider	4	5	9
Pedestrian	3	13	16
Other road users	32	10	42
Total	347	153	500

Table E4 – Type of road user killed in crashes where excess or inappropriate speed was identified as a contributing factor, 1996-1998

Source: LTSA Crash Analysis System.
Notes: *Excludes motorcycle riders/pillions. "Urban" refers to all speed limit areas of 70 kph and under, and to limited speed zones; "Rural" refers to all speed limit areas of over 70 kph.

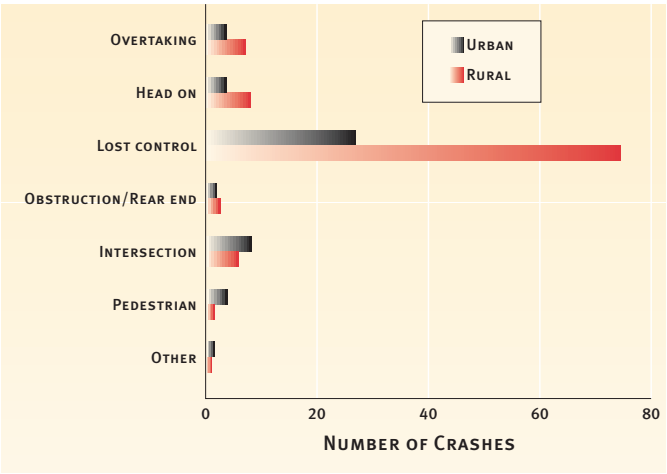


Figure E5 – Types of fatal crashes with excess or inappropriate speed identified as a contributing factor (annual average 1996-1998)

Source: LTSA Crash Analysis System.
Notes: "Urban" refers to all speed limit areas of 70 kph and under, and to limited speed zones; "Rural" refers to all speed limit areas of over 70 kph.

In crashes in which excess or inappropriate speed was identified as contributing to the crash, the speeding driver and his or her passengers are the road users most likely to be killed (Table E4). Speeding motorcycle riders also represent a high number of those killed in crashes in which excessive speed was identified as contributing to a crash.

In fatal and injury crashes involving excessive speed, by far the most common type of crash is one in which the driver lost control of the vehicle (see Figures E5 and E6). The data shown in Figures E5 and E6 include both single-vehicle and multi-vehicle crashes. Single-vehicle crashes are those in which the driver lost control of the vehicle either on a straight or when cornering and collided with an object (or pedestrian) in the roadside environment; multi-vehicle crashes are those in which the driver lost control and crashed into another vehicle. The majority of crashes are, however, single-vehicle crashes. For example, of the fatal rural crashes in which excessive speed was a contributing factor and the driver lost control of the vehicle, 72% were single-vehicle crashes. Similarly, 76% of the fatal urban lost-control crashes involving excessive speed were single-vehicle crashes.

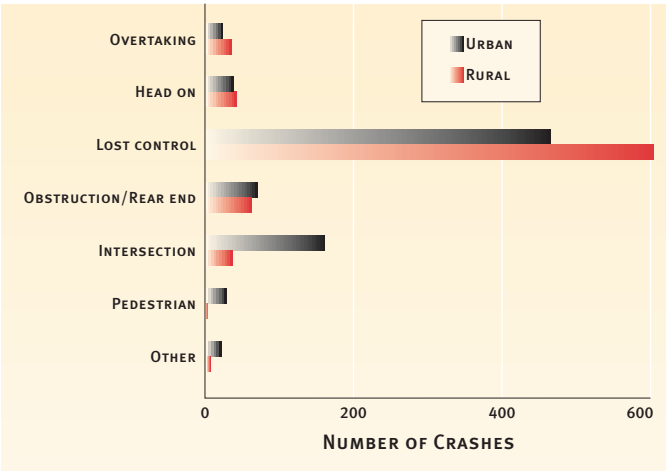


Figure E6 – Types of injury crashes with excess or inappropriate speed identified as a contributing factor (annual average 1996-1998)

Source: LTSA Crash Analysis System.
Notes: "Urban" refers to all speed limit areas of 70 kph and under, and to limited speed zones; "Rural" refers to all speed limit areas of over 70 kph.

The 15- to 24-year-old age group has the greatest number of drivers identified as travelling at excess or inappropriate speeds in fatal crashes (see Figure E7). Of the 15- to 24-year-old drivers involved in fatal crashes between 1996 and 1998, 35% were identified as travelling at excess or inappropriate speeds, compared to 17% for 25- to

64-year-old drivers. Hence, speed is disproportionally represented in crashes involving a young driver. Across all age groups, male drivers involved in fatal crashes are also more likely to have been travelling too fast for the conditions than are female drivers. For example, 77% of the drivers involved in fatal crashes from 1996 to 1998 were males, and 85% of the drivers in fatal crashes involving excessive speed were males.

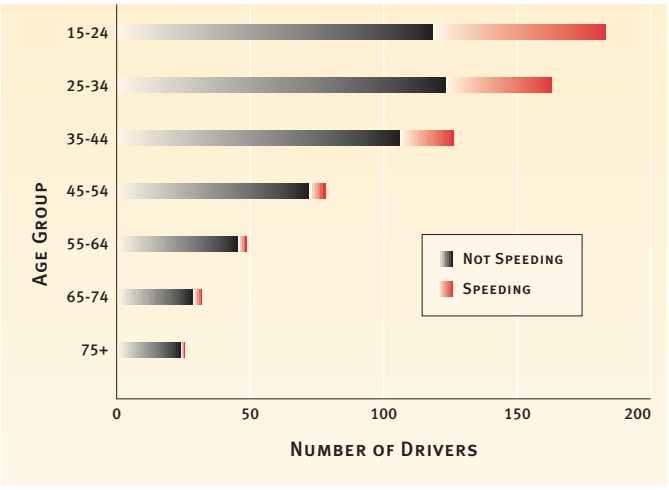


Figure E7 – Drivers identified as travelling at excess or inappropriate speeds in fatal crashes by age group (annual average 1996-1998)

Source: LTSA Crash Analysis System.

From 1996 to 1998, 21% of car and van drivers and 39% of motorcyclists involved in fatal crashes were identified as travelling at excess or inappropriate speeds (see Figure E8). Only eight percent of truck drivers involved in fatal crashes were identified as travelling at excess or inappropriate speeds.

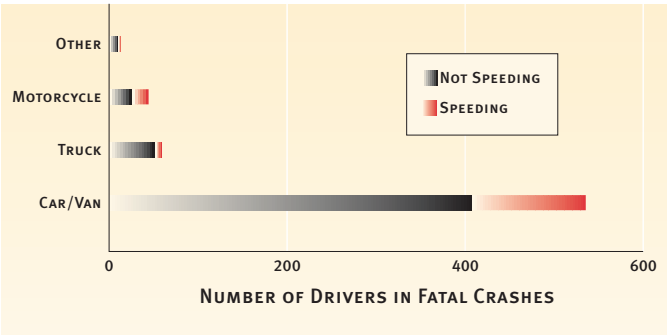


Figure E8 – Drivers involved in fatal crashes by vehicle type and by whether excess or inappropriate speed was identified as a contributing factor (annual average 1996-1998)

Source: LTSA Crash Analysis System.

Of the car or van and truck drivers identified as travelling at excess or inappropriate speeds in fatal crashes from 1996 to 1998, just over half (58% and 60% respectively) were killed in the crash. However, of the motorcycle riders identified as travelling at excess or inappropriate speeds in fatal crashes, the vast majority (89%) were killed in the crash. This illustrates the greater vulnerability of motorcyclists over other vehicle occupants.

Travel Speed Data

The Land Transport Safety Authority conducts surveys of driver speeds at a sample of sites around New Zealand each year during winter. The survey involves unobtrusive roadside measurements of vehicle speeds over a period of about two hours. The speeds measured are for cars travelling at "free" speeds, unimpeded by other vehicles or by the road environment (the sites at which vehicle speeds are measured are on straight sections of road, away from traffic lights and intersections).

Table E5 displays the national results of the speed surveys since 1995. At the national level, rural mean speeds remained relatively constant from 1995 to 1999, with the exception of a decrease in speed in 1997 (the increase in mean speed from 1997 to 1998 was statistically significant at the five-percent level). In contrast, national urban mean speeds appear to have fallen each year since 1995 (although the differences from one year to the next are not necessarily statistically significant).

Speed	1995	1996	1997	1998	1999
Rural, mean	102.4	102.3	101.6	102.2	102.1
Rural, 85th percentile	115	115	113	113	113
Urban, mean	57.4	56.5	56.3	55.9	55.8
Urban, 85th percentile	65.5	63.5	63.0	63.0	62.5

Table E5 – Speed data from the annual national winter speed surveys, 1995-1999

Source: LTSA Crash Analysis System.
Notes: The speed at the 85th percentile is the speed at or below which 85% of the vehicles travelled; that is, 15% of vehicles travelled above this speed. "Urban" refers to 50-kph speed-limit zones. "Rural" refers to 100-kph speed-limit zones.

Overall, from 1995 to 1999, mean speeds in both rural and urban environments at the national level were above the speed limit. The mean speed in the urban areas was further

above the limit than the mean speed in the rural areas. Furthermore, the speeds at the top end of the speed distribution (above the 85th percentile) were very high, particularly in rural areas. This is a concern because, as discussed in the first section of this Part, the open road in New Zealand was designed for speeds of approximately 80 kph, with some sections of road upgraded to a 100-kph design speed. A large proportion of drivers are therefore travelling at speeds above the speed for which the road was designed to be safely travelled on. This means that drivers travelling above the design speed who encounter objects on the road in the distance will have less chance of stopping under emergency braking and avoiding a collision with the object. Also, by travelling above the design speed, there is a high chance of losing control of the vehicle on curves. As seen above, the loss of control scenario represented a large proportion of the crashes in which excessive speed was a contributing factor.

The high mean speed in urban areas is also of concern because of the presence of vulnerable road users. For example, a pedestrian hit by a vehicle at the 1999 mean speed of 55.8 kph would have over an 80% chance of being killed (see Figure A15, in Part A). Furthermore, the chance of a pedestrian being killed if hit by the fastest 15% of urban traffic before their brakes are applied is close to 100%.

It is estimated that, if the rural mean speed could be reduced by 4 kph, from 102 to 98 kph, there would be fewer people killed and injured on New Zealand's rural roads each year. Nilsson's formulae from Section 1a of Part A can be used to calculate the size of the reduction in deaths and injuries from reducing the rural mean speed. Although the formulae apply to crash reductions, they can be generalised to injury reductions because the ratio of casualties to crashes remains approximately constant.

Table E6 displays the injury savings when the mean speed is reduced from 102 to 98 kph. For example, in 1998 350 people were killed on New Zealand's rural roads. Applying Nilsson's formula, we can see that the number of people killed if the mean speed was reduced from 102 to 98 kph would be 298. Hence 52 people's lives would have been saved if the mean speed was reduced by 4 kph. Similarly applying Nilsson's formula, the 4-kph mean speed reduction would save 185 people from being fatally or seriously injured, and would save 442 people from being injured in a crash.

Injury Type	Number of Injuries in 1998 (rural roads)	Nilsson's Formulae: Number of Injuries if Mean Speed Reduced from 102 to 98 kph	Number of Injuries Saved
Fatal	350	$(98/102)^4 \times 350 = 298$	52
Fatal and Serious	1,634	$(98/102)^3 \times 1,634 = 1,449$	185
All Injuries	5,753	$(98/102)^2 \times 5,753 = 5,311$	442

Table E6 – Injury savings on rural roads in 1998 given a reduction in the mean speed from 102 to 98 kph

Source: LTSA Crash Analysis System.

Attitude Data

The New Zealand Public Attitudes Survey has been undertaken periodically since 1974, and annually since 1994, to evaluate attitudes to road safety issues, primarily alcohol-impaired driving and speed. Face-to-face interviews about these issues are conducted in May and June of each year with respondents aged 15 and over, in towns, cities, and rural areas throughout New Zealand. In 1999, 1,645 people were interviewed, including 1,417 who held drivers' licences (LTSA, 1999a).

New Zealanders' awareness of speed as a road safety issue in 1999 has dropped slightly since 1998, returning to 1997 levels. When asked what factors make travelling on New Zealand roads unsafe, just over half spontaneously mentioned speeding (see Figure E9). One fifth (21%) identified speed as the **main** factor that made New Zealand roads unsafe.

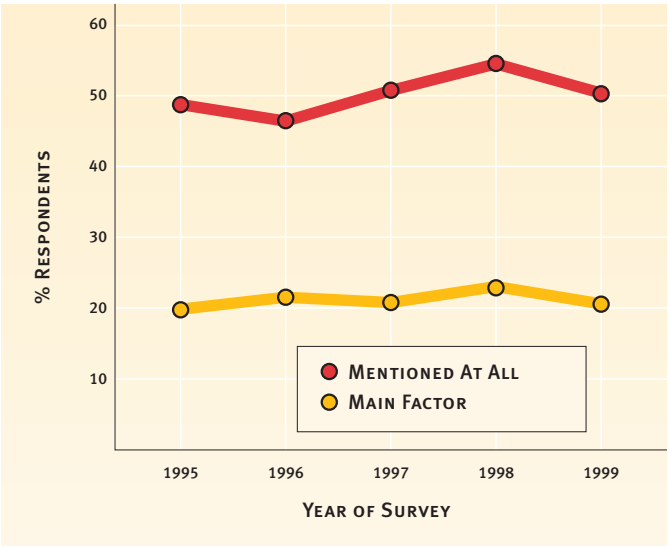


Figure E9 – Things that make travelling on NZ roads unsafe: speed

Source: LTSA (1999a).

Despite this recognition of speed as a major road safety issue, the speeding culture is still strong. For example, 44% of male drivers and 32% of female drivers say that they enjoy driving fast on the open road. This attitude is particularly strong among drivers under 35 years (see Figure E10). For example, 56% of 25- to 29-year-olds say that they enjoy driving fast on the open road.

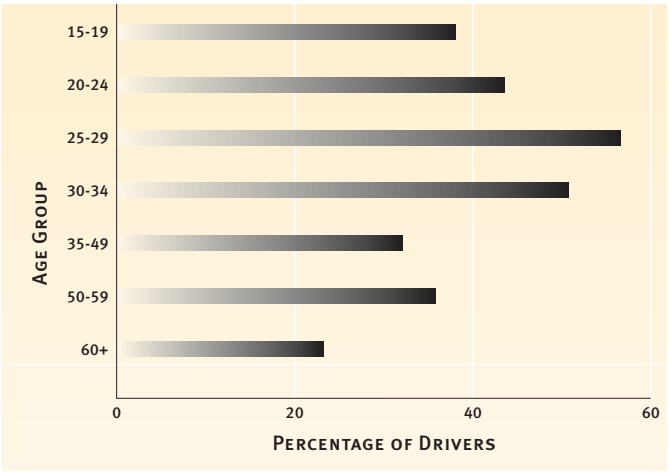


Figure E10 – Percentage of drivers in each age group that said they enjoy driving fast on the open road.

Source: LTSA (1999a).

The perceived risk of a crash when speeding is not understood as well as the perceived risk of a crash when drink-driving (see Figure E11). For example, 22% of male drivers and 14% of female drivers agree that "there isn't much chance of an accident when speeding if you are careful". In comparison, 10% of male drivers and six percent of female drivers agree that "there isn't much chance of an accident when driving after drinking if you are careful". Drivers in the 50-plus age group are more likely to agree with the statement "there isn't much chance of an accident when speeding if you are careful" than younger drivers. For example, 26% of drivers in the 60-plus age group agreed with the statement, compared to 13% of 20- to 24-year-old drivers.

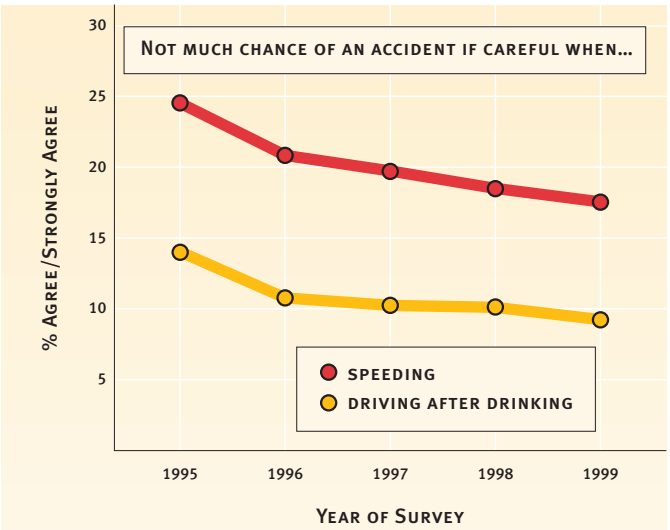


Figure E11 – Percentage of New Zealanders who agreed or strongly agreed with the statements "There is not much chance of an accident if you're careful when speeding" or "when driving after drinking"

Source: LTSA (1999a).

The findings relating to speed enforcement were generally positive. They were:

- Three-quarters of New Zealand adults agree that **enforcing the speed limit** helps to reduce the road toll. However, 41% think that the risk of being caught speeding is small.
- Fewer New Zealanders now believe that **penalties for speeding** are not very severe. In 1997, 38% of people agreed with this statement, but by 1999 this had reduced to 32%.
- Sixteen percent of drivers (18% of males and 13% of females) reported receiving a **speeding ticket** in the previous year. Drivers under the age of 35 years were most likely to report receiving a speeding ticket (see Figure E12). For example, 23% of 15- to 19-year-old drivers reported receiving a speeding ticket in the previous year.

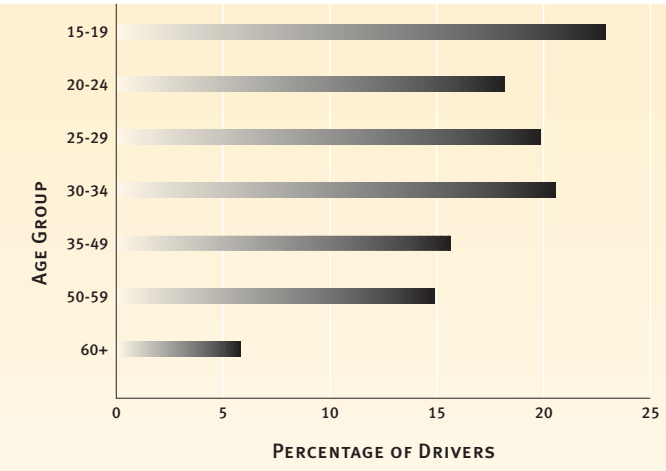


Figure E12 – Percentage of drivers in each age group that reported receiving a speeding ticket in the previous year

Source: LTSA (1999a).

- Most people find **extremely high speeds** unacceptable. Eighty-five percent supported automatic loss of licence for drivers caught speeding at 150 kph on the open road and 88% supported this for drivers caught at 90 kph in a 50-kph zone.
- Support for **retaining speed limits** at current levels was high (71% for open roads and 77% for 50-kph zones). There was less support than in previous years for introducing additional 60-kph and 80-kph speed limits for some roads (52% support in 1999, compared to 58% in 1998 and 64% in 1995). These speed limits have been introduced in some areas over the last four years.
- Support for **speed cameras** has reduced slightly since 1998, back to 1997 levels. Sixty percent of New Zealanders agree that the use of speed cameras helps lower the road toll and 63% think that they are operated fairly (compared to 68% and 70% respectively in 1998). Opinion is fairly evenly divided over whether speed cameras should be hidden or in full view, with many people supporting a mixture of the two modes.
- More people think that they would be likely to **receive a ticket** from a speed camera than from a police officer (see Figure E13). For instance, when driving at 120 kph in a 100-kph zone, 83% would expect to receive a ticket from a speed camera[63], but only 59% (an increase from 50% last year) would expect a ticket from a police officer who was present. The higher perceived risk of detection for speed cameras over police officers was discussed in Part C.

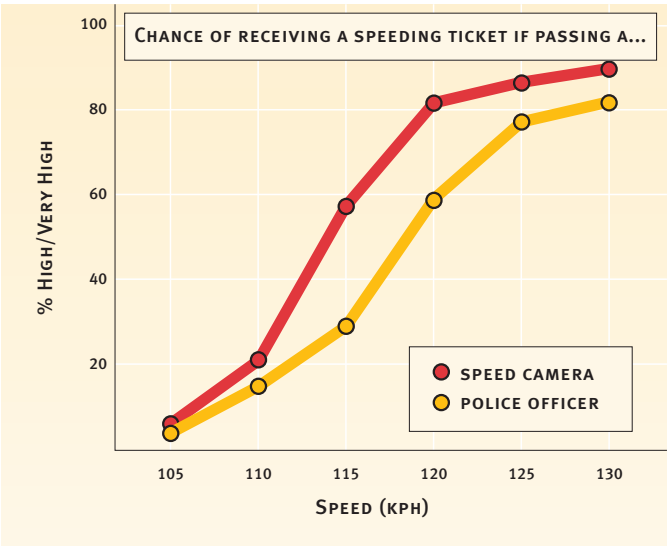


Figure E13 – Percentage of New Zealanders who felt that the chance of receiving a speeding ticket if passing a speed camera or a police officer was high or very high

Source: LTSA (1999a).
Note: The question relating to the speed camera implied that the speed camera was operational at the time.

63 The question about receiving a ticket if passing a speed camera implied that the speed camera was operational at the time.

Conclusions

- Speeding contributed to 162 deaths, 539 serious injuries, and 1,896 minor injuries in 1998. Speeding is likely to be under-reported in data on crash factors because of the difficulty in identifying it.
- The majority of speed-related crashes in which someone dies occur on rural roads, whereas minor injury crashes involving speed are almost equally likely to occur on urban or rural roads.
- The 15- to 24-year-old age group has the greatest proportion of drivers identified as travelling too fast for the conditions in fatal crashes.
- From 1996 to 1998, 21% of car and van drivers and 39% of motorcyclists involved in fatal crashes were identified as travelling too fast for the conditions.
- From 1995 to 1999, national surveys have indicated that mean speeds in both rural and urban environments are above the speed limit.
- Attitudinal surveys indicate that:
  - one-quarter of respondents identified speeding as the main factor that made New Zealand's roads unsafe.
  - 44% of male drivers and 32% of female drivers say that they enjoy driving fast on the open road.
  - 16% of drivers reported receiving a speeding ticket in the previous year.

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