Role of Road Features in Cycle-Only Crashes in New Zealand

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Abstract

Research carried out in 2001 examined the causes of cycle crashes on roads, footpaths, and cycle ways throughout New Zealand, through a survey of injured cyclists. Crashes due to impact with a moving motor vehicle were excluded, as the emphasis was on the role of road features in these crashes.

Of these crashes 28% were due to road features, mainly to loose gravel and irregularities in the road surface. Other factors were the cyclists' own actions, bicycle problems, actions of others, and crashing when trying to avoid collision with another being, or object. Most crashes occurred in fine weather and in daylight, on straight roads, away from intersections, in urban areas.

Two cycling crash patterns emerged from the study: crashes in urban areas mainly occurred when cyclists were using their cycle for transport, while crashes in 100km/h speed zones mainly involved those using their cycle for sports training.

Paper

A survey was carried out in 2001, to identify the causes of cycle-only crashes on our public roads, cycle ways and footpaths. Of particular interest was the role of road features in these crashes. This report presents the findings of this survey.

Details including causes of cycle crashes involving a motor vehicle are reported on the Land Transport Safety Authority's (LTSA) crash analysis system. Cycle-only crashes (i.e. those not involving impact with a motor vehicle) are excluded from this system. Hospital and Accident Compensation (ACC) records distinguish cycle-only crashes from those involving a motor vehicle, and from these records cycle-only crashes appeared to be twice as frequent as cycle and motor vehicle crashes. However insufficient detail was available to determine their causes. A 1989 study of cycle crashes in Christchurch found 20% were due to road features, in particular to loose gravel and poor maintenance. This 2001 study was to determine by survey whether the Christchurch findings applied throughout New Zealand between 1999 and 2000.

The group surveyed were cyclists who had received either treatment for a cycle-only crash, as public hospital inpatients or compensation from Accident Compensation Corporation (ACC) for specialist treatment or other assistance. The survey was by questionnaire.

Objective 1:
To examine factors related to on-road cycle-only crashes and, where these relate to road features, to identify the feature and its role in causing crashes.

This project found the following factors were related to cycle-only crashes.

Cyclist characteristics and injuries

- Cyclist characteristics: 50% of those injured were under 19 years of age, and the majority (62%) were males. This is consistent with the cycle population in general. Age and cycling experience were strongly related, i.e. the younger cyclists were the least experienced.

- The most frequently injured body parts were the arms, head, and teeth, each constituting approximately 20% of the injuries. The most frequent injury type was fracture, though concussion featured in 20% of the injuries, and dental injuries in 18%. Over half of the injuries required admission to hospital. Helmets were worn by 85% of the cyclists at the time of the crash, 10% reporting that their helmet had come off during their crash.

Location and conditions at the time of the crash

- Most of the crashes (81%) occurred on the road, rather than on footpaths or cycle ways. The crashes tended to be on straight sections of road away from intersections. Most crashes (81%) occurred in light road traffic, and in good weather and visibility conditions, with 90.3% occurring in dry conditions, 69.3% in calm winds, and 86.3% in daylight.

- Most (58.7%) of the crashes occurred in 50km/h areas. The main reason for cycling was for transport (53.6%) as opposed to sport or leisure. A strong relationship existed between cycle use and speed zone in that the majority of cyclists who crashed in 100km/h areas were out training, and most of those who crashed in urban areas were using their cycle for transport.

About the crash

- Of the crash cyclists, 86.3% had cycled through their crash location before. The majority of the cyclists regarded their crash site as safe prior to their crash. When asked whether they were going too fast, 41% responded they were, yet when asked to consider what could have prevented their crash, only 26% suggested travelling slower. Most of the cyclists (52%) considered the main prevention strategy was something they could have done, such as being more attentive or travelling slower. Some cyclists (22%) considered road improvements as the main means of crash prevention, and the remainder considered issues with their cycle (maintenance, securing

loads, appropriately adjusted cyle parts (pedals, handlebars) problems (maintenance, unexpected failures, loads or feet slipping off pedals), and behaviour of other people or animals, in that order, as main means of crash prevention.

- In identifying the main cause of their crash, cyclists were slightly more outwardly focussed than when asked to consider the main preventive strategy. Nevertheless, most (33%) attributed the crash to their own actions, and road features were attributed as the second greatest cause (by 28% of cyclists), 16% to a cycle problem, 11% to another person (mainly a cyclist), and 7% to avoiding (but not hitting) someone or something moving. Younger cyclists (below 15 yr) tended to blame themselves rather than road features for their crash, compared to older cyclists. We suggested this may be reticence by the younger cyclist in identifying road features, or it may reflect their inexperience.

- Of the road features identified as crash causes, loose gravel caused the single greatest number of crashes (34%). Surface irregularities, when considered as a group of features (e.g. corrugations, uneven surfaces, potholes), accounted for 39% of crashes.

Objective 2
To propose solutions to minimise crash risk presented by these road features to cyclists. If appropriate these solutions could be implemented by the road controlling authorities.

Maintaining roads free of loose gravel was recommended to minimise the incidence of cycle crashes. The irregularities and the conditions in which they cause problems for cyclists need to be defined.

Objective 3
To determine the relationship of this study to other studies on cycle crashes, and in particular to compare the number of cycle-only crashes that could be related to road features.

Conclusions
- Road features accounted for 28% of cycle-only crashes.
- Of the individual road features, loose gravel caused the greatest proportion of crashes, a finding that is consistent with the Christchurch study.
- Of grouped road features, surface irregularities accounted for 39% of crashes.
- Road furniture does not appear to be a significant crash cause.
- The majority of crashes involve those under 19 years old. This age group is of the least experienced cyclists and are the most likely to blame the crash on themselves.
- The majority of crashes were in urban areas (i.e. <60km/h).
- Most of the crashes in urban areas involved cyclists using their cycle for transport (e.g. commuting to work, school, shopping), and most of the crashes in 100km/h speed zones involved cyclists who were out sports training.

Recommendations
- Minimise loose gravel on the parts of the road where cyclists ride.
- Define the effect of surface irregularities on cycle stability (e.g. by research).
- Verify the results of this survey with the New Zealand cycling population.
- Better understand the nature and requirements of road riding for different user groups (e.g. leisure, transport and sports cyclists, and younger cyclists), so that problems unique to each group can be identified.
- Define the relationships between surface irregularities and the different cyclist groups, especially those of younger cyclists.