

A Report on
Child Cycling Safety

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Executive summary

The research project identifies and examines various issues related to the cycling safety of urban school children in Hamilton aged between eight and 15 years of age in Hamilton. The report outlines, discusses and evaluates the various negative and positive variables that affect the level of cycling safety experienced by urban school children. Research-based recommendations are provided with three purposes in mind. First, some are intended immediately to enhance the effectiveness of existing physical and educational provisions. Second, some are intended to promote discussion of possible amendments to the strategies and overall structure of responsibility and authority of bodies of control, such as local and regional authorities, as well as interest and advocacy groups with a view to achieving enhanced safety provisions through new ideas and approaches. Third, and most fundamentally, these two kinds of recommendations are designed to achieve short-term and sustained long-term reductions in the rates of cycling accidents involving urban school children. As such, the underpinning objective of this report is to create an accessible resource of information and recommendations relevant to any party interested in the safety of child cyclists in urban areas.

The research project employed a variety of methodologies of both a qualitative and a quantitative nature. These comprised an extensive literature review, an analysis of relevant cycle-accident statistics, interviews with expert and key informants, discussion with focus groups of school children, a series of observational studies of traffic situations, and questionnaires for caregivers. The information being obtained through this combination of methods reinforces this report and its findings in relation to current provisions and strategies, highlighting specific areas of concern in regards to child cycling safety.

Due to funding and time constraints the Hamilton urban area was selected as the area of empirical investigation for this project. Hamilton is however quite representative of the majority of New Zealand urban areas for the purpose of this report.

The recommendations have been organised to target specific affected groups. The recommendations include:

Caregivers

- Caregivers should ride bicycles with their child(ren).
- Caregivers should work out safe cycle routes with their child(ren).
- Check children's bicycles regularly with the child(ren) present.
- Make sure children are not 'overloaded' when cycling.

Local, Regional and National Authorities

- Develop cycle route maps to and from schools.
- Commit to improving road engineering to maximise cycle safety.
- Develop a 'Road Code' for cyclists.
- Motorists' *Road Code* to include cyclists.
- Policing of cyclists use of hand signals.
- Motorist behaviour needs to be monitored more closely.
- Take into account children's ideas and perspectives when making decisions that directly affect them, in this and other areas.
- Communicate with schools when developing new initiatives in areas near schools.

Children

- Children must also take responsibility for their learning.
- Children need to obey road rules.

Schools

- Develop a bright-coloured uniform sash or jacket.
- Introduce entrances for cyclists into schools which are off main roads to avoid heavy traffic areas.

- Schools should implement a 'cycle warrant of fitness' to ensure that the bicycles are safe to ride. This could work especially well in conjunction with local bicycle shops.
- Do not overload students cycling to and/or from school.
- Schools need to provide ongoing child cycling safety education programmes to develop and maintain marked improvements in cycling skills.

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And finally, thank you to the Child Accident Prevention Foundation of New Zealand for the opportunity to conduct this research project. We have found this research to be an enjoyable experience from which we have learnt a great deal. We hope you find this report as interesting as we have, and that its outcomes and recommendations prove to be beneficial to your objectives.

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1. Introduction

Cycling can be an enjoyable and beneficial activity for children for a number of reasons. Children can gain a measure of independence from caregivers in cycling to and from school (Christchurch City Council, 2000). Child cyclists receive many health benefits from cycling and these largely outweigh the potential risks of cycling. This, however, is not intended to trivialise the potential dangers, but rather highlight the potential benefits of children cycling. Cycling can increase fitness, it is cost effective and it is also environmentally friendly. However, all cyclists face the risk of harm when cycling on urban roads.

This research aims as a baseline to identify and evaluate current educational and physical cycle safety strategies and provisions. The purpose of this report is then to provide research-based recommendations that have the potential to maximise the safety of children cycling on urban New Zealand roads. This research has primarily focused on locations near schools and major intersections, because these areas present the most risk to child cyclists.

Children, in general, possess a lower level of practical and theoretical knowledge in regards to cycle safety practices than adults. They are also less likely initially to have experienced on-road practical guidance cycling alongside motorised vehicles. This emphasises the importance of the responsibility that caregivers, motorists, organisations and interest groups have in maximising the safety of child cyclists. This responsibility is further highlighted by the inability of child cyclists to become greatly involved in the processes behind the various decisions, strategies and provisions that have a direct impact on their safety.

Newspaper articles identified some specific dangers of cycling in Hamilton. McGovern (15 April 2000) suggests “[w]hatever you believe, statistically Hamilton is less safe than other similar sized NZ cities for traveling by bicycle” (p6). This

underlines the relevance of a focus on Hamilton even though the recommendations are thought to have a wider relevance to urban New Zealand.

The literature review examines current research and strategies in regards to child cycling safety. It also provides an evaluation of current child cycling safety provisions and identifies salient areas of concern in relation to child safety and cycling. An analysis of current statistical information illustrates the size and characteristics of this issue. The literature review also includes an examination of mass media reports which serves to support the information and concerns highlighted by the above material. Finally, this review discusses current educational programmes and addresses the need for further and ongoing educational programmes. This leads to a discussion of new proposals regarding cycling safety strategies.

Fieldwork was conducted to obtain primary data on child cycling safety practices and provisions. Observation exercises provided insight into the behaviours of cyclists and motorists. It also assisted in an examination of existing physical cycle safety provisions such as the green advanced stop lanes and cycle lanes in Hamilton. Questionnaires were distributed to caregivers of child cyclists to determine their specific concerns in regards to their children cycling to and from school. The child focus groups provided an understanding of child cyclists' specific concerns in regards to cycling as well as their level of knowledge in regards to road signage and road rules. Interviews with key and expert informants further enriched the information procured through the literature review and provided valuable information on which to base the recommendations.

The information that was developed within the literature review and the fieldwork has been combined and is focused in a discussion chapter. This draws out the key issues and concerns in regards to child cycling safety. It is apparent that there are a number of deficiencies in current cycle safety provisions. These form the basis for the report's recommendations, which are intended to maximise child cycling safety.

2. Methodology

2.1 Introduction

Qualitative and quantitative research methods were used in this research. Both primary and secondary data have been used to ascertain and investigate the salient issues in regards to child cycling safety.

2.2 Literature Review

A literature review was undertaken to evaluate current provisions and educational strategies in child cycling safety. It also highlighted areas of concern where specific child cyclist needs required further attention. The review supplied evaluations of the current strategies and proposals for further changes to assist in maximising cycling safety. Literature on both child cycling safety, and cycling safety in general, provided a good resource upon which to base some of the recommendations for this research.

The literature review was organised in terms of significant topics as identified by the researchers. Strategies for child cycling safety were examined to demonstrate the current practices and relevant legislative provisions. This was undertaken concurrently with an investigation into the concerns regarding these practices and legislative provisions.

A search for New Zealand media articles was undertaken using Newztext INL and NZPA online databases at the University of Waikato. The media reports were obtained to determine current cycle practices, views and organised cycle programmes, as well as to illustrate specific instances of child cyclist accidents. Thirty-three media articles were collated and examined. These articles provided an informative picture of a variety of issues which specifically affect and target child cyclists, caregivers and other interested groups, as well as illustrating the way the media frame this issue.

It was necessary to undertake an investigation into current statistics on child cyclist accidents and fatalities. Statistics were collected from the Land Transport Safety Authority on the numbers of cyclists who are hurt or killed on New Zealand roads. This demonstrated the extent of this problem. The statistics were also necessary to illustrate discrepancies between the actual incidence of child cyclist accidents and the representation of the issue by the New Zealand media.

Finally, the literature review highlighted several valuable suggestions for amending and improving child cycling safety strategies. This section demonstrated the need to establish and act upon sound and constructive safety strategies

2.3 Fieldwork

2.3.1 *Observation Exercise*

The observation exercises were undertaken to develop a primary understanding of the road behaviour of cyclists and other road users in terms of road rules and the use of safety provisions. We aimed to understand some of the problematic elements that impact on the safety of urban child cyclists.

To elicit the most comprehensive representation of road behaviour it was necessary to incorporate both qualitative and quantitative empirical approaches. We felt this was necessary for several reasons:

- To establish knowledge of the dynamic variables that influence the safety of urban child cyclists on the road.
- To collect direct quantitative data to check the validity of data from indirect secondary exercises of a similar nature, as well as to obtain knowledge of specific patterns of child cycling in Hamilton.
- To collect direct data of a qualitative nature to supplement and develop the quantitative findings with a richer and more data-dense picture.

The observation exercises consisted of eight 40-minute 'blocks' where the researchers observed the behaviour of road users. To conduct the observation exercise the 40-minute blocks of investigation were broken into eight five-minute segments. Four of these segments were dedicated to the qualitative dimension and four to the quantitative dimension. These qualitative and quantitative segments were alternated throughout the 40-minute investigation block.

The observations of the sites were conducted during peak traffic times, namely the 40-minute period preceding and following the beginning and end of the school day. The selection of these times, over other times of potential interest such as lunch times and weekends, was for three reasons:

1. It allowed an opportunity to observe child cyclists at peak traffic flows thus providing an understanding of child cyclists in terms of their observance and conduct of road rules and standard road behaviour under the pressure of heavy traffic.
2. It provided the environment for the researchers to observe how physical safety provisions stand up to heavy traffic.
3. It allowed an opportunity to observe the behaviour of other road users in relation to the presence of physical safety provisions and child cyclists.

Six locations were selected based upon the presence of the following conditions:

- Proximity to schools.
- Broad composition of child cyclist age groups.
- Times of heavy traffic volumes.
- Intervening variables, such as bus stops, school crossings, roundabouts, green painted cycle provisions and cycle ways.
- Type of neighbouring school, such as high school, primary school and intermediate school.

2.3.2 Focus Groups

The focus groups employed a combination of both qualitative and quantitative methodology. The design of the focus groups was of a semi-structured nature, wherein there were some pre-formulated questions placed under broad topic areas that acted to guide the researcher throughout the conduct of the exercise.

The quantitative component used images depicting road safety rules or common road signs. The students were asked to identify the 'give way' rules on a series of images. These results were recorded and analysed to provide a breakdown of the students' understanding of basic road safety rules. They were also asked to identify images depicting street signs to evaluate their knowledge of road signage.

The second component of the focus groups was to provide a forum for discussion covering the general and specific areas of the students needs, concerns and interests in regards to road cycling safety.

Five focus groups were held within four different schools. Each focus group covered a time span of approximately forty minutes. The focus groups consisted of eight students of similar age. Students at five different schools ranging from primary to high schools were asked to participate in the research. The group composition consisted of four male students and four female students. One focus group contained two males and five females due to the volunteer response at that particular school. The intention was largely to keep the focus groups balanced in terms of the male/female composition and homogenous in terms of age groups.

2.3.3 Questionnaires

The questionnaires targeted the caregivers of children who cycled to school and those caregivers who preferred their children not to cycle to school. The aim of the questionnaires was to gauge caregivers' views, concerns and ideas in order to understand their role in achieving safer cycling in the Hamilton region.

The questionnaires consisted of a combination of nine short answer and multi-choice questions. They also provided an opportunity for caregivers to add further comments to relay unanticipated concerns regarding child safety and cycling (see Appendix One for more details).

Teachers at five different Hamilton schools were given questionnaires to hand out to the students. The students were asked to take the questionnaires home and ask their caregivers to fill them in. They were then instructed to return the questionnaires to their teachers. These were collected approximately two days later by the researchers. Forty-six questionnaires were returned by caregivers of children aged between seven and fifteen¹. These questionnaires have been used to form the basis of the concerns and suggestions of caregivers, outlined in the Fieldwork section of this report.

2.3.4 Interviews

Five interviews were undertaken with a mix of key and expert informants. These interviews were intended to elicit information and current practices regarding cycling safety in the Waikato region. The interviews were all of an informal nature and used both telephone and face-to-face modes. The length of the interviews varied from thirty-five to fifty minutes. The interviews were discussional in form and relied minimally on interview schedules designed to prompt specific themes or queries. The information from the interviews was collected in note form and later summarised to highlight the most pertinent issues that transpired during the interviews.

Key Informants

Interviews with key informants provided valuable insight into the general concerns of interested parties regarding child safety and cycling. A principal and vice-principal of a local Hamilton primary school detailed concerns regarding the physical environment and the dangers this poses to child cyclists. They also elucidated the issues in regards to the relationship the school has with local body organisations, and funding concerns.

¹ Caregivers of children who cycle to school tended to be the ones who returned the questionnaires. Children aged between seven and fifteen were targeted as those under seven were less likely to cycle to and from school and those over fifteen have not been considered 'children' in this research. It is also more likely that individuals aged over fifteen may have access to their own motorised vehicles.

An interview with a youth education officer from a local Hamilton police station reiterated the concerns expressed by the above interviewees. That is, the police youth education officer also identified funding restraints and concerns regarding the physical environment. She also discussed the importance of appropriate road user behaviour.

Expert Informants

Interviews with expert informants provided detailed information on child cycling safety and the issues local bodies face in regards to developing effective safety programmes. Two semi-structured in-depth interviews were undertaken with individuals working in the field of road safety. These highlighted cyclists' needs and current provisions in regards to child cycling safety.

An interview with the Road Safety Traffic Engineer at Hamilton City Council, Andrew McKillop, informed the researchers on current physical cycle safety provisions and discussed specific concerns in regards to these. This interview supported the findings from the literature review.

The Road Safety Coordinator from Hamilton City Council, Dawn Williams, promotes cycle safety practices. The interview provided insight into current educational strategies being employed in the Waikato district.

2.4 Recommendations

The findings in this report were organised and examined thematically to form a basis for the recommendations. The recommendations present practical physical and educational strategies that can be employed by interested groups. Due to time and financial constraints, this report is unable to provide a comprehensive account of child cycling safety. However, recommendations for further research have also been made.

3. Literature Review

3.1 Introduction

This report examines current research, practices and strategies in child safety and cycling. The literature review focuses on New Zealand material as overseas research and practices may not adequately fit the New Zealand experience. The literature review indicates the current strategies that are in place to improve cycling safety for both child and adult cyclists. Existing educational and safety provisions primarily focus on educating children on general road rules and developing children's cycle skills.

3.2 Current Practices in Place

3.2.1 Helmets

Overseas research has suggested that the majority of serious cycle injuries occur to the cranium and the brain (*Young People and Bikes*, 1994). On 1 January 1994 it became mandatory in New Zealand for all cyclists to wear a cycle safety helmet² (*ibid.*), and individuals caught without a helmet can receive a fine.

Cycle safety helmets have been designed specifically to withstand the force of one fall resulting in a knock to the helmet (*ibid.*). It has been suggested that helmets be checked and/or replaced after being subject to such a blow (*ibid.*).

² Some individuals may be exempt from wearing a cycle safety helmet on the basis of religion or an injury which prevents the individual from wearing one (*Young People and Bikes*, 1994).

3.2.2 Clothing

Recommendations have been made regarding the types of clothing worn by cyclists. It is important that children wear clothing that will ensure they will be visible to motorists (Land Transport Safety Authority, 2000). Bright colours and reflective clothing are two options for children. For those child cyclists who are required to wear school uniforms, bright coloured jackets and/or reflective vests should be available as they will increase their visibility to motorists (see Recommendations). It is also important that caregivers ensure that children do not ride with baggy clothing that may get caught in the chain or gears of their bicycles.

3.2.3 Lights and Reflectors

Bicycles are also required to be fitted with a front and rear light during the hours of darkness (*Young People and Bikes*, 1994). The front light must be white and the rear light must be red or yellow (*ibid.*). It is mandatory for all bicycles to be equipped with a rear reflector. These regulations are outlined in sections 43 and 44 of the Transport Regulation 1976. While children are not encouraged to cycle during darkness, it is important for caregivers to be aware of the dangers of children not being seen during these hours and thus equipping bicycles with such apparatus is vital.

3.2.4 Education Resources

A number of resources have been published to provide schoolteachers with research-based material to aid in teaching children about road cycle safety (Boulter, 2000). These resources provide teachers with information on current law, suggestions for practicing cycling skills and games for children to play based around cycling safety issues (*Road Safety Series: Out and About: A school road safety education programme for years 7-8.*, n.d.; Land Transport Safety Authority, 2000).

The resources cover practical, written and oral exercises for the children. Practical exercises include cycling handling skill such as maneuvering around objects, weaving, hand signaling and looking over the shoulder (Road Safety Series: Out and About: A school road safety education programme for Years 7-8., n.d.; Land Transport Safety Authority, 2000). Such exercises are necessary to equip children with the essential physical skills in regards to handling a bicycle. However, it is also necessary to take into account the age of the child. Practical road handling skills can only be undertaken in classes where the majority of students are both capable of riding a bicycle and own a bicycle. Thus such exercises can usually only be undertaken with classes of students aged seven years and above.

Written and oral exercises include readings, identifying road dangers, recognizing road signs, cycling laws, and cycle safety games. Such exercises can be undertaken with all school-aged children. It is important however, to consider the age of the students as the level of complexity regarding the educational content will vary for children in different school years. Thus, five to six year olds can be taught about safety factors such as the meaning of the different coloured lights at intersections and the broad dangers that may be present on the roads (*Road safe series: Stepping Out: A school road safety education programme for Years 0 – 1.*, n.d.). Children aged above seven years can learn more about road rules, road hazards and safety equipment (Land Transport Safety Authority, 2000).

3.2.5 Road Engineering

The Land Transport Safety Authority have been trialing 'Advance Stop Lanes' in Auckland, Hamilton and Christchurch (Boulter, 2000). Within the Hamilton region, the Advance Stop Lane is painted green³ and is situated at the front of some major intersections. The objective of this is to allow cyclists to situate themselves ahead of the traffic so they can traverse the intersection before motorised vehicles when allowed to do so (at the green traffic light).

³ In Hamilton and Auckland the Advance Stop Lanes are green and in Christchurch the Advance Stop Lanes are red.

A second strategy around New Zealand is the use of cycle lanes. Here white lines are painted on the roads to indicate a section of the road to be used by cyclists. This meets cyclists' needs to have a reasonable cycling width away from motorised vehicles. Cycle lanes are not present on all roads but tend to be reserved to some busy roads and near some schools.

3.3 Current Areas of Concern in Regards to Child Cycling Safety

3.3.1 Cyclists Breaking Road Rules

Boulter (2000) of the Hamilton City Council argues that cycling policy must be incorporated into wider transport policy. This will enable authorities adequately to consider cyclists when designing policy which will directly affect them as road users.

Boulter (2000) also asserts that cyclists on occasion "break the law to protect their own safety" (p18). He suggests several reasons for this. Motorist behaviour and the general design of the road at times renders official advice on road behaviour ineffective for cyclists.

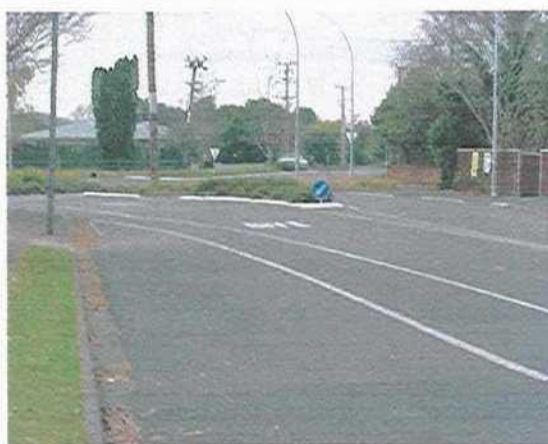
3.3.2 Behaviour of Motorists

Research has shown that motorists do not share the road well with cyclists and this in turn can endanger cyclists (Wood, 1999). Motorists need to realise that bicycles are legitimate vehicles on the road (*National roads board urban transport council guide to cycle facilities*, 1985).

Boulter (2000) states that widespread negligent motorist behaviour can negatively impact on cyclists and furthermore, such behaviour is often dismissed or is regarded with indifference. Motorists using mobile phones and violating the speed limit put cyclists at risk of an accident. Cyclists may be 'pushed' towards the kerb or 'cut off' at intersections. It is also not widely known that overtaking cyclists at intersections is illegal (Boulter, 2000).

3.3.3 Cycle Lanes

While cycle lanes provide cyclists with a route separated from the main traffic, Boulter (2000) points out that such cycle lanes have no legal status and thus motorised traffic can drive and park in the lanes becoming obstacles for cyclists to maneuver around. However, separate cycle lanes on roads can provide more space for child cyclists and this may be particularly beneficial on approaching intersections and/or roundabouts (see below).



3.3.4 Helmets

Helmet wearing puts the responsibility for safety on cyclists, however, most accidents are largely caused by others (Boulter, 2000). Helmets protect the head against injury but some research has indicated that the use of helmets has the potential to increase injury (*ibid.*). Boulter (2000) also argues that wearing helmets may have an adverse effect and that wearers and motorists may take cyclists' safety for granted. That is, they may behave (wrongly) as if "[helmets] will effectively protect against a crash involving a motor vehicle; this can give the cyclist a false sense of security and thus induce 'risk compensation'" (Boulter, 2000, p39).

It has been recommended that helmets be changed every four years, however, constant dropping or knocking of helmets may damage them and thus further placing the child at risk of injury in an accident (Anonymous, 12 October 2000). Thus, helmets should be checked and/or replaced after a hard knock or if visual signs of

damage appear (*ibid.*). As a result, helmets should not be relied upon as a complete safety measure.

3.3.5 Road Engineering

Research undertaken by Environment Waikato (1997) suggests that poor road design may significantly increase the risk of danger for cyclists. They assert that,

“Generally, provision for cyclists has been lacking in designing of roads. Conflict with other vehicles is the most common cause of injury accident for cyclists. As the cyclist will always come off second best in an accident with another vehicle, it is important that driver/rider education and road design ensure that the space between cyclists and other traffic is maximized.” (Environment Waikato, 1997, p64).

As new roads are designed, it is necessary to take into account the needs of cyclists.

“Almost all roads (except, for example, motorways) can legally be used by cyclists. No matter how many special facilities are created some cycling will still be done on the roads. Therefore, in the design, construction and maintenance of roads consideration of cyclists’ special needs should be given.” (*Guide to Cycle Facilities.*, 1985, p2).

This is particularly significant on roads near schools where large volumes of child cyclists are present.

Research has indicated that roundabouts and junctions are a high-risk zone. Wood (1999) argues that “[m]ost cycle accidents happen at road junctions and this is where present cycle provision is weakest.” (pi). This kind of issue will be expensive to remedy, however, if local authorities are committed to increasing the safety of child cyclists, such projects will need to be considered, especially in areas near schools. New initiatives are being developed to increase the safety of cyclists at roundabouts, providing more space for cyclists.



It is important that such initiatives are implemented on roundabouts near schools and on all main cycle routes to maximise the safety of child cyclists.

Wood (1999) also suggests that driveways are danger zones for cyclists. This is especially pertinent to children as schools are most often located in residential areas. Child cyclists may be overlooked because of their size thus increasing the possibility of being hit by motorists. Furthermore, child cyclists are often forced into illegal maneuvers such as cycling on the footpath (Boulter, 2000) when traffic is heavy, drivers are aggressive or roads are narrow. This places child cyclists at further risk of being hit by a motor vehicle when motorists are reversing from driveways.

3.4 Statistics

Statistical data provided by the Land Transport Safety Authority⁴ illustrate the patterns in child cycling accidents⁵ over a six-month period. The data show that there has been no significant decline in number of children being fatally injured on New Zealand roads. Further, the number of cycling injuries has declined only slightly from April 2001 to October 2000. The extent of the injuries is not apparent, nor how serious these injuries are. The statistics did not reveal regional information therefore they did not highlight whether those areas with cycling strategies in place had declines in fatalities and injuries as a result.

⁴ *Stats* is a monthly report on the number of road accidents. The data used in this report come from issues dated April 2001, March, 2001, February 2001, December 2000, November 2000 and October 2000. The information regarding January 2001 is not available.

⁵ "Child" refers to those aged 15 years and under.

“Over the last decade, school aged children (five to 15 year olds) have made up 6% of the road toll and 9% of all reported injuries. This age group makes up about 16 percent of the population” (Land Transport Safety Authority, 2000, p3). There has been a decline in the number of children cycling to school which has been largely due to the increase in motor vehicle volumes, compulsory helmet wearing and issues with road safety (Christchurch City Council, 2000).

The Land Transport Safety Authority (2001) assert that “in the 12 months ending August 2000 there were 21 cyclists killed and 564 reported injured in collisions with motor vehicles. Hospital records show that there were 259 cyclists injured seriously enough to be admitted to hospital” (p3). It was also stated that “one third of the cyclists injured were children under the age of 15” (ibid, p3). Wood (1999) asserted that the reporting rates of injuries from cycle accidents are low. Such statistics are thus of enhanced concern because we can assume if Wood’s (1999) comment is true, that the above data under-represents the actual number of children being injured on New Zealand roads.

3.5 Media Reports

The media articles on cycling safety reiterated the serious concerns that are highlighted throughout the literature review. They drew attention to the physical dangers children face when riding bicycles, they provided a commentary upon the debate regarding the cycle safety helmet issue and they emphasised the significance of relevant and specialist cycling education. Media articles also discussed the new child cycling safety initiatives within New Zealand.

3.5.1 Physical Dangers

Children are exposed to a number of physical dangers when cycling on New Zealand roads. One important factor is the design of children’s bicycles. In the *Waikato Times* (Anonymous, 16 January 1997) highlighted the necessity of having a bicycle that suited the child. The size of the bicycle is significant as the child’s feet should comfortably reach the ground, brakes must be in good working order and it is

imperative to ensure the bicycle is correctly assembled (Anonymous, 16 January 1997, p14). McNeil (21 April 1999) interviewed a surgeon who stressed the physical dangers children may face when involved in a cycling accident. The hollow metal handlebars on bicycles can become lethal after breaking through the rubber grip (*ibid.*). Surgeon Spenser Beasley asserts “[t]he current handlebar design cuts through children like cheese” (*ibid.*, p14) and can cause critical injuries such as liver, bowel and kidney damage (*ibid.*).

Newspaper articles suggest that the physical dangers for cyclists have not been adequately addressed. The NZPA (1 May 2001) maintain “... the absence of poor state cycleways was evidence of “decades of neglect” of cycling...” (http://www.knowledgebasket.co.nz/nzpas...9&vk=nzpa00%2Ftext%2F00may01_%5B483%5D). They go on to suggest that “[t]oo few roads were designed with cyclists in mind and too many motorists saw cyclists as a nuisance...” (*ibid.*, http://www.knowledgebasket.co.nz/nzpas...9&vk=nzpa00%2Ftext%2F00may01_%5B483%5D). McGovern (15 April 2000) argues that poor cyclist facilities can exacerbate the problem of substandard driver behaviour. McGovern (15 April 2000) suggests that “[t]oo often we hear that cyclists are “hard to see”. More to the point, they are easy to overlook!” (p6). Motorized vehicles are a significant physical risk to child cyclists. “...[a]t least 50 percent [of cyclist accidents] and probably more involve motor vehicles.” (NZPA, 1 May 2000, http://www.knowledgebasket.co.nz/nzpas...9&vk=nzpa00%2Ftext%2F00may01_%5B483%5D).

3.5.2 Cycle Helmets

Cycle safety helmets are highlighted as a salient issue in regards to child cycling safety and the benefits and limitations are reiterated within media articles. Sergeant Verheyen (cited in *The Press*, Anonymous, 17 January 2001, p26) stated that children should wear a helmet which has is the appropriate size, worn correctly and safety-approved. The Land Transport Safety Authority assert that there is currently a 95% compliance rate to the cycle helmet law and there has been a 30% reduction in head injuries since the introduction of the law (Bain, 24 March 2001).

Boulter (2000) argues that cycle helmets can create a 'false sense of security' and detract attention from other important safety issues. Several other media articles have reinforced this sentiment. For example, an NZPA newspaper article suggested "[n]ational and local government had to look beyond cyclists' behaviour and deal with the risks other road users imposed on cyclists, instead of seeing measures such as compulsory helmets as 'the be all and end all'." (NZPA, 01 May 2001, http://www.knowledgebasket.co.nz/nzpas...9&vk=nzpa00%2Ftext%2F00may01_%5B483%5D). *The Waikato Times* printed an article by Roger Boulter (22 January 2001) who suggests that helmets should not be relied upon to keep children safe. He says "[b]asically, if you make something look too safe, people respond by taking less care." (p6). He finishes by suggesting that "[a] helmet is designed for falls, not crashes, and will not compensate for bad road behaviour." (*ibid.*).

3.5.3 The Need for Education

Sergeant Graeme Newby (cited in Posselt, 25 January 2000) stressed the necessity of educating children in cycling skills and road safety rules. He says "People forget that a bicycle is a vehicle. Road safety rules have to be in place – but many parents don't bother with the training." (cited in Posselt, 25 January 2000, p1). Caregivers must be made aware of the risks their children face while attempting to share the road with bigger, faster and heavier motorized vehicles.

An article in *The Evening Standard* by B.H. Mackrell (27 March 1997) maintained that without the necessary training and education, children often misuse roads and footpaths. B.H. Mackrell (27 March 1997) also emphasized the need for proper monitoring of this issue. If local authorities are not committed to upholding laws and regulations regarding cycle safety then educational strategies may be compromised.

Caregivers also need to be aware that young children may not perceive road hazards as adults do. Sergeant Graeme Newbery (cited in Posselt, 25 January 2000) stated that "... small children in particular do not have good peripheral vision. Their perception of time and space is not well developed" (p1). This was reinforced by the NZPA (16 January 1997) who suggested that children "... judge the speed, distance,

and sound of vehicles less accurately” (p14). This further highlights the necessity for ongoing practical education for children to develop these kinds of road skills.

3.6 Proposals on New Cycling Safety Strategies

3.6.1 Proposed Educational Changes

The literature review identified several proposed changes to maximise child cycling safety, particularly in regards to educating children. It has been suggested that child cycling safety should be developed appropriately and integrated further within school curricula. Boulter (2000) argues that “[c]yclists education be coordinated, expanded and refocused so as to be incorporated comprehensively in school curricula as a ‘basic life skill’.” (p31). Currently educational cycling strategies are taught as an isolated module and do not possess the comprehensive benefits of a continuous programme (such as swimming programmes within schools). For example, while campaigns such as ‘Ride Safe’ provide valuable education targeted specifically at children, they tend to be promoted over a weeklong period (Environment Waikato, 2000), and thus the skills developed during the programme may not be retained.

Regardless of the duration of the cycle safety programmes, there are a number of good initiatives which have been implemented. These include programmes such as ‘Share the roads’ and ‘Bike Wise’. Environment Waikato (2000) intends to promote the ‘Safe route to school campaign’. Environment Waikato (2000) have also discussed the possibility of developing a nationwide cycling safety campaign. The implementation of a nationwide strategy is essential as it can aid in the facilitation of a standardised cycle safety framework. This has the potential to heighten the awareness of both cyclist and motorists leading to greater co-operation on the roads.

Boutler (2000) identifies that “[a] bicycle in law is a vehicle, yet is not shown in any of the ‘road code’s’ many vehicle maneuvering illustrations.” (p36). This is problematic as motorists are not educated on how to interact with and maneuver around cyclists. This needs to be explicit in the *Road Code* (Boulter, 2000) where all drivers would then be obliged to learn the appropriate ways to share the roads with cyclists.

3.6.2 Proposed Physical Changes

Environment Waikato (1997) believes that it is likely the number of people cycling will continue to grow so the development of appropriate provisions is necessary. Physical safety provisions to be addressed include:

- Adequate carriageway width to avoid crowding and conflict with other vehicles
- Smooth surfaces particularly at road edges
- Minimal road slope and crossfall
- Good road lighting
- Few parked vehicles or other obstacles (Environment Waikato, 1997, p64)

Cyclist infrastructure also needs to be addressed. Environment Waikato (1997) have proposed that separate cycleways be developed which prohibit access to motorised vehicles. This will maximise and promote child cyclist safety by removing some of the most dangerous hazards for cyclists. If separate cycle ways are not a viable option then more cycle lanes on roads are considered an alternative.

Environment Waikato (2000) have identified that roads need improved design to accommodate a variety of vehicles including bicycles. For example, they assert that “[r]oundabouts continue to be a safety problem for cyclists” (Environment Waikato, 2000, p36). Local authorities are currently aware of the road design issues and are making progress in regards to addressing these as new roads are designed or old roads are maintained.

4. Fieldwork

4.1 Introduction

Fieldwork was undertaken to procure primary data on child cycling safety practices and provisions. Both quantitative and qualitative data were collated to provide a current account of cycling within the Hamilton region. Child cyclist and motorist behaviour was observed to ascertain specific behaviours around several major intersections and schools. Focus groups at various local schools gave insight into the knowledge students possess regarding road rules as well as their general cycling safety concerns and their cycling behaviour(s). The questionnaires indicated the concerns of caregivers regarding their children cycling to and from school. Interviews with key and expert informants highlighted the current provisions for cyclists and specified key areas of concern.

4.2 Observation Exercise

In 1999 a new initiative in cycle safety commenced in the Waikato region. Green advance stop lanes were painted at two of Hamilton's busiest intersections, the Peachgrove and Ruakura Road intersection and the Peachgrove Road and Clyde Street intersection (cited in *Waikato Times*, Anonymous, 15 September 1999).



These green advance stop lanes allow cyclists to position themselves ahead of traffic, thus encouraging them to move before the cars and other traffic as the lights change. Peter Bielby, Hamilton Road and Traffic Manager, suggests that the green advance lanes make these intersections safer for cyclists. However, the observation exercises highlighted several salient concerns in regards to the use and misuse of the advance stop lanes.

While in general the majority of child cyclists attempted to utilise the green advance lanes, drivers of motorised vehicles exhibited impatient behaviours as cyclists took more time to cross the intersections. Drivers would 'honk' their horns at cyclists and children were at times 'cut off' by drivers as each attempted to traverse the intersections. It also became apparent that while the green advance lanes provided access for the children to cycle ahead of traffic, in places no cycle lane was provided past the intersection and thus children were attempting to ride along side traffic in often narrow and precarious conditions. Under such conditions children were often cut off by motorised traffic or compelled to withdraw very close to the roadside curb. One situation illustrated the potential dangers of this. A child cyclist fell from his bicycle after a four-wheel drive vehicle overtook the cyclist and then attempted to pull into a park immediately after the intersection, effectively obstructing the path of the child cyclist. This situation may be avoided with the continuance of cycle lanes past the green advance lanes.

Motor vehicles also stopped on the green advance cycle lanes, which in turn encouraged cyclists to either pull in behind cars or cycle close to the curb. Another issue associated with the green advance cycle lanes is that one lane has been painted over a drainage grate. Children are then forced to either pull out into the path of motorised traffic or onto the footpath in order to avoid the grate. In one report (*Into the Mainstream*) project manager Roger Boulter (2000) suggests that some cyclists engage in unsafe cycling practices or break traffic laws in order to make themselves safer (see Literature Review). The observation exercise counted four children break the law by cycling on the footpath and thus place pedestrians at risk of being hit. Over the years an increasing number of alternative modes of transport, for example, wheel chairs, skateboards, roller-blades, non-motorized scooters and bicycles, are using our footpaths. With wheeled vehicles and pedestrians vying for footpath space,

footpaths have become increasingly congested and increasingly dangerous for pedestrians. Yet for some cyclists using the footpath appears to be a safer option than using our roads. Initiatives such as the green advance cycle lanes need to be carefully and thoroughly considered before being put in place to avoid placing children further at risk of a bicycle accident.

The issue of child cyclists using footpaths was not limited to busy intersection areas. The observation exercise counted 83 cyclists using the footpath to enter and exit the school grounds (see Methodology). Of these 83 cyclists, only eleven dismounted their bicycles. This particular school had in place multiple safety regulations to avoid such practices. However, several factors may influence the students decisions to cycle on footpaths. Firstly, the school is located on a busy Hamilton road. Secondly, a bus stop situated between the car park entrance and the school exit often proved to be an obstacle for cars and cycles exiting the school grounds. As the bus pulled into the bus bay, cars exiting the school were forced to move out further onto the road to gain a clear vision of oncoming vehicles. This in turn put the cyclists in danger as they were forced either to ride further out in the fast moving lanes or to cycle on the footpaths. Thirdly, caregivers dropping children off at school often parked on yellow lines further exacerbating the above situation. Thus, children may feel safer cycling on footpaths rather than entering the school grounds from main roads in amongst heavy motorised traffic.

The observation exercise also highlighted the amount of compliance with the helmet wearing law. Of the 196 child cyclists, 78.1% wore cycling helmets. Of the cyclists who did not wear helmets, 21 students had helmets with them and 22 appeared not to possess a cycling helmet. While helmet wearing is an essential element in keeping child cyclists safe on the road, Boulter (2000) argues that there are serious repercussions of this that must be considered. In promoting helmet wearing the onus of safety is placed on those most vulnerable, namely the child cyclist, when in fact accidents are largely the fault of others (Boulter, 2000). Boulter (2000) also suggests that motorists may take more serious risks around cyclists wearing helmets believing that cyclists are safe because they are wearing protective headgear. He goes on to argue that directing attention to helmets, other salient issues may be overlooked such as the behaviour of cyclists and drivers (*ibid.*).

Many children cycling to and from school carried large bags, sports equipment and other accessories that appeared hazardous to their cycling. Children often swung from side to side as the weight of their luggage threw their balance off center. This is of serious concern as the control these children had of their bicycles appeared compromised. This can be considered a very avoidable cycling safety hazard.

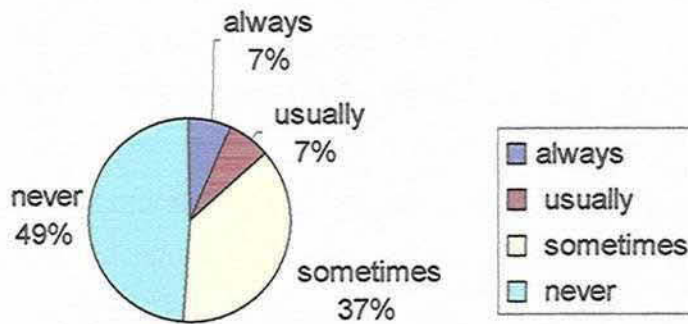
The observation exercise also indicated that cyclists and motorists appeared to overlook each other while sharing the roads (see Literature Review). The reasons for this can only be explored through further research, but it must be taken into consideration that cycling is not clearly addressed in the *Road Code* except when framed as a 'hazard' which the following motorist should avoid (Boulter, 2000).

4.3 Questionnaires

Forty-three questionnaires were completed by caregivers of students at a variety of schools in the Hamilton region. These questionnaires provided information on the concerns and opinions of caregivers regarding their children cycling to and from school.

The research demonstrated that of the caregivers who completed the questionnaires, a significant number have children who do not cycle to school (see below). This is consistent with the research of the Land Transport Safety Authority which suggests that "on-road cycling has decreased by 19% with the largest decrease among school-aged and teenagers" (Land Transport Safety Authority, 2001, p1).

Frequency of Children Cycling to and from School



It is interesting to note that only fourteen percent of children, whose caregivers completed the questionnaires, ‘always’ or ‘usually’ cycle to and from school. The reasons for this were indicated in question six of the questionnaires. Caregivers most commonly cited three factors which influenced whether they allowed their children to cycle to and from school. The first factor was that caregivers felt that the roads were too unsafe. Secondly, caregivers indicated they felt there were too many main roads for their children to cross. Finally caregivers also cited that they felt there were not enough cycling lanes between their home and the school. However, even where separate cycle lanes were provided, several safety issues are evident. Traffic has to pull out in front of cyclists to merge in with other motorised traffic. The roads immediately outside schools are busy with motorised traffic picking up school children and this can further exacerbate the above problem. Cyclists can then become ‘sandwiched’ between motorised vehicles. The illustration below depicts this issue.



The respondents also highlighted areas that could be improved to maximise child cycling safety. The most common response was in regards to providing separate cycling lanes independent from roads and motorised traffic. Caregivers also indicated more cycling lanes were necessary in general. However, as discussed above, this may not be the most appropriate solution and off-road cycle lanes may provide a more positive solution. (Note: the cyclist in the foreground above has been anonymised).

Also of serious concern to caregivers was the education of drivers and better cycling safety education for children. Educating both cyclists and drivers may help to raise awareness of cyclists on roads and general road rules, thus improving the interaction between motorists and child cyclists.

The questionnaires indicated that the majority of children, whose caregivers completed the questionnaires, had undertaken some form of cycling safety education. Caregivers indicated that there was some improvement in their child's cycling behaviour yet few noticed a marked improvement. Another area of concern was indicated through the comments made by some caregivers. These comments suggested that a number of caregivers were uncertain of the level of their children's cycling skills.

4.4 Focus Groups

Focus groups were conducted with children from primary, intermediate and secondary schools. They provided an overview of the practices and concerns that child cyclists

possess in regards to cycling to and from school. The focus groups also provided an impression of the safety measures students are taking when cycling to and from school and they indicated the amount of knowledge that the school children possess in regards to cycle safety rules.

The students were asked about the safety precautions of which they are aware in regards to cycling in urban areas. The students from each of the schools were able to identify cycle safety helmets and reflective clothing as important safety equipment. The primary school aged children were the most comprehensive of all the students, identifying other safety features to consider such as the state of the bicycles tyres, brakes and the size of bicycles. Primary aged children were also more comprehensive in regards to identifying the use of accurate cycle safety helmet wearing. They were able to identify how a helmet should be properly fitted and how to adjust a cycle safety helmet. Students from both intermediate and secondary schools voiced concern about wearing cycle safety helmets, commenting that they look 'dumb', they 'mess up hair' and they 'choke' the user. They mentioned that the 'cool' helmets were too costly and as a result, the students stated they would not wear their cycle safety helmets until they were away from school grounds.

The students also discussed the different hazards they are aware of on urban roads. The primary aged students were again more comprehensive in their observations. They identified parked cars opening doors as of specific concern. They also discussed the need to observe their path for potholes, bumps, speed humps and rubbish bags. The intermediate aged children identified buses, bridges, speeding traffic and wet weather as primary concerns when cycling on urban roads. The secondary school students were the least comprehensive in identifying specific hazards but after prompting, also identified wet weather and slippery surfaces, buses and bridges as hazards when cycling to and from school. Each group of students was aware that cycling on footpaths is prohibited but they also mentioned the need to use footpaths to avoid dangerous situations on the road.

The green advance stop lanes prompted discussion as many of the students were confused about how these were to be used. The intermediate students also mentioned concern about being ahead of the traffic, especially when directly in front of a bus.

They felt they did not move fast enough to be situated ahead of traffic and because of this, felt unsafe using the green advance stop lanes. The secondary school students stated they felt the green advance stop lanes did not work at all and preferred not to use them.

The focus groups were asked to identify seven common road signs and six illustrations depicting give way rules (refer to Appendix Two and Three). The primary school children were reasonably accurate, especially in regards to the road signs. These students had more trouble identifying the give way rules. When they were able to provide the correct answer regarding who gives way, they were often unable to provide the reason the individual needed to give way. Intermediate children were more hesitant in answering and their knowledge seemed to have degenerated compared with the primary children.

Each of the focus groups identified a number of improvements that could be made to maximise their safety. The primary school children identified more cycle lanes as a provision that could improve their safety. They also suggested that trucks and other large traffic slow down when passing children on bicycles. The intermediate children identified a need for separate off-road cycle tracks and more accommodation for cyclists on bridges. High school students in the focus groups also identified a need for off-road cycle tracks and wider cycle paths. Further, they suggested lower speed limits, more crossings and turning lanes to maximise their safety when cycling.

The focus groups also highlighted the need for further ongoing cycle safety education. While the primary school aged children appeared to have a good understanding of road rules, signage and hazards, this knowledge seemed to deteriorate as the students got older. High school children indicated that the cycle safety programmes were not entirely effective. They suggested that more skill-orientated and practical education would provide the students with a more constructive programme.

4.5 Interviews

Several interviews were undertaken with both key and expert informants to further highlight specific areas of concern in regards to child cycling safety. The interviews corroborated much of what was found in the literature review and also supported many of the findings of observation exercises

4.5.1 Expert informants

Road Safety Traffic Engineer

An interview was undertaken with the Hamilton City Council's Road Safety Traffic Engineer, Andrew McKillop. McKillop is responsible for physical road safety provisions, changes and design. As McKillop has an approximate budget of \$300 000 per annum to establish initiatives for all road users, it is necessary for him to prioritise his projects. In regards to cycling safety, McKillop suggests the variety of categories of cyclists on Waikato roads must be considered independently as each has particular needs. In regards to child cycling safety, he advocates there are several problematic areas that require attention.

Firstly, McKillop suggests that the speed of traffic outside schools may be problematic. However, McKillop goes on to propose that speed signs are not necessarily the best indicator of the actual speed of traffic. Thus attempting to address the pace of traffic outside schools by reducing speed limits may not result in the desired effect.

McKillop also asserts that the green advance stop lanes have suffered 'teething problems' as some cyclists have not demonstrated a clear understanding of how these are to be effectively used. Motorised traffic also cause a problem as they often drive onto the green advance stop lanes when no cyclists are utilising them. McKillop also suggests that as the green advance stop lanes are a new initiative, motorists and may not yet be familiar with the appropriate way to use them. He argues that currently there are not enough green advance stop lanes and that the more common they become in Hamilton, the more effectively they will be used by both motorised traffic

and cyclists. The Hamilton City Council have distributed a pamphlet to households throughout Hamilton to educate drivers and cyclists on the purpose and practice of green advance cycle stop lanes.

Road Safety Coordinator

The Hamilton City Council Road Safety Coordinator is Dawn Williams. She educates and promotes safer cycling in conjunction and consultation with community groups. She discussed several educational strategies and programmes in the Waikato region.

The Hamilton City Council have launched the 'Moo-Loo' mascot as part of a campaign to promote road safety messages to both children and adults. They have also addressed the issue of the visibility of cyclists by providing cyclists with free reflector stickers. In the past the Council has also conducted safety campaigns such as 'share the roads, look for cyclists'. This message has been distributed at vantage points for oncoming traffic such as on bus signs and through the radio at peak traffic times. The issue of road sharing has been highlighted as a serious issue in regards to the safety of cyclists (see Literature Review). This campaign attempts to address this issue.

Future plans include the implementation of a practical cycling safety course to be held during school holidays. This will give children the opportunity to gain practical experience in using the roads and cycling along side motorised traffic.

Williams also discussed the role of the Police Youth Education Officers. They are responsible for educating school children on cycling safety. This initiative is particularly useful as it identifies and targets the needs of children in different age groups and cycling safety modules are designed on the basis of this.

Williams asserted that the community perspective was an essential factor in formulating child cycling education programmes. Currently there is an under-representation of cyclists input and in particular the views of child cyclists'. When formulating these child cyclist safety programmes, the Hamilton City Council investigates injury rates and statistics. Two primary reasons for focusing on child

cyclists are that children are over-represented in injury statistics and it is more problematic to alter the opinions and behaviours of adult cyclists, thus focusing on children may have greater long term benefits.

It was indicated by Williams that a focus was needed on intermediate school aged children. This was based on there being a higher concentration of primary schools, thus intermediate children are likely to cycle a greater distance and may have to contend with busier roads. Further, intermediate aged children may not receive the same intensity of cycling safety education. There is also an assumption that, as intermediate children are older, they would have more cycling experience. Parents are also more likely to allow children within this age group to cycle to and from school.

4.5.2 Key Informants

Youth Education Officer

Sergeant Marcus Lyman of a local Hamilton City Police Station outlined three areas of police responsibility in regards to cycling safety. Firstly, education is targeted at a school level. Secondly, the police observe road user behaviour and have the authority to enforce this appropriately. Finally, police officers are required to report hazardous physical obstacles such as potholes. The focus on child cyclist safety is largely dependent on the yearly budget which determines the number of hours devoted to specific areas of child cyclist safety. The police work directly with Environment Waikato's Road Safety Coordinator and local authorities such as Hamilton City Council in regards to road safety.

Principal and Vice Principal of a Local Hamilton Primary School

The Principal and Vice Principal of a local Hamilton Primary School indicated several areas of concern regarding child cycling safety. The issue of parking outside the school was referred to as a matter requiring attention. Motorised vehicles such as cars and buses contribute to traffic congestion, which creates a hazard for school pedestrians and cyclists. Child cyclists are often forced to negotiate their way around parked and moving vehicles putting them in danger of being knocked off their bicycles. Furthermore, surrounding shops are problematic as these invite additional

traffic, exacerbating the above problem. This school is also located on a main road and increasing traffic flows and traffic speeds are increasing the risks for child cyclists.

These key informants discussed several specific incidents where their attempts to maximise child safety have not been supported by local regional authorities.

- A staff member of the school approached a local authority to suggest barriers outside the school to maximise the safety of the school children. This suggestion was declined on the basis that it was unnecessary as the child cyclists and pedestrians were considered well behaved.
- The local authorities failed to consult the school fully on the proposed changes to the speed limit directly outside the school. School representatives were invited to contribute halfway through the proceedings and staff members felt the decision had already been made.
- It took two years for the school successfully to convince the responsible local bodies to construct a turn-in lane for the driveway.

Such difficulties in implementing practical cycle safety provisions highlight the need for greater communication and cooperation between local schools and local authorities.

The staff of this particular school administer a comprehensive cycle safety programme in conjunction with the police. However, this course limits the time teachers have to focus on other school curriculum activities. In addition, the cycle safety programme is not perceived as an adequate measure of ensuring the safety of child cyclists in isolation of other provisions or changes as outlined above. Further, it was suggested that parents often encourage the use of footpaths as cycle lanes as they are perceived as less dangerous than roads. The practice of cycling on footpaths detracts from the lessons covered in the cycle safety programme, as students do not learn the skills they need in order to become skilled at cycling along side traffic.

In response to the issues raised by the Principal and Vice Principal in this interview the school has implemented a rule that asserts only children in years five and six may cycle to and from school. The key informants are aware that this provides limited practical experience for children but safety is the primary concern.

5. Discussion

Over recent years, there has been a decline in the number of children cycling to and from school (Christchurch City Council, 2000). Caregivers and teachers indicated that this has been influenced by factors relating to child cycling safety. Child cyclists face a number of hazards when cycling on New Zealand roads. Research has indicated that child cyclists constitute “9% of all reported road injuries” (Land Transport Safety Authority, 2000, p3). The above statistic was based on the road crash data from the Land Transport Safety Authority (2000, 2001). Therefore, records and reports from hospitals, general practitioners and caregivers have not been taken into account. Thus it is likely that the number of unreported child cyclist road accidents would be significantly higher than this.

The current design of many New Zealand roads can place child cyclists at greater risk of an accident. Roundabouts and junctions are currently the most problematic areas for child cyclists. Motorists and cyclists must negotiate a roundabout alongside each other however there is limited space for cyclists and other vehicles to traverse a roundabout concurrently. This issue can be magnified by motorists either not seeing or not giving way to cyclists. Motorists require education on sharing the roads with cyclists and in particular, sharing the road with child cyclists. One way to educate motorists is to include cyclists more adequately in the *Road Code* so as to reinforce the fact that bicycles are legitimate vehicles and cyclists are legitimate road users. Motorists must be made aware that give way rules include cyclists and they are required by law to treat cyclists as they would any motorised vehicle.

Junctions are particularly congested areas and cyclists are not provided with specific cycle paths, thus they are required to cross junctions alongside motorists. This needs to be taken into account when junctions are maintained or new junctions are designed to provide cyclists with safer paths. City councils are recognising the need to address

this issue. Advance stop cycle lanes are being trialed in a number of New Zealand cities to allow cyclists to move ahead of traffic. However, the observation exercises in Hamilton indicated several pertinent problems with this initiative. Motorists were seen stopping on these 'cyclist only' areas thus cyclists were unable to utilise the advance stop cycle lanes effectively. The green advance stop lanes also do not provide space for the cyclists to ride alongside motorised vehicles. As motorised vehicles are, in general, faster, they often catch up to cyclists as they are negotiating the intersection. This can result in cyclists being 'pushed' close to the gutter, putting them at greater risk of either a collision with a motor vehicle or riding into the roadside kerb. While pamphlets have been delivered to Hamilton residents educating them on how to utilise the green advance cycle lanes, the observation exercises indicated that further education is necessary. More green advance stop lanes would also increase awareness of this cycle safety provision and thus may lead to more effective use.

An interview with Hamilton City Councils Road Safety Traffic Engineer, Andrew McKillop, indicated that due to the constraints of a limited budget he must take into consideration all road users and the most effective ways to provide for road users. Therefore cyclists cannot be recognised independently. In order to increase cycle safety standards it may be necessary to increase the budget and consider cycling as an independent issue so as to provide provisions that target the safety of cyclists specifically. For example, cycle entrances to schools are often on main roads and traffic can be heavy in these areas particularly before and after school. Buses and motorists dropping off children are further obstacles for cyclists to negotiate around and this can place child cyclists further onto the road in the path of motorised vehicles. By either removing cyclists from these heavily congested areas through creating specific cycling entrances or developing separate 'drop off' stations for buses and motorists, the risks to child cyclists may be minimised.

Cycle safety provisions such as helmets aid in reducing head injuries. The observation exercises indicated that the compliance rate to the cycle safety wearing law is high, however, it could be improved. Many campaigns have addressed this issue, however this raises another pertinent issue - cycle safety helmets do not protect children from having accidents. Children need to be seen by motorists and there are a

number of issues that need to be addressed to improve the visibility of cyclists. Firstly, bright reflective clothing could be made mandatory for school aged cyclists. Many school uniforms are neutral colours which can make school cyclists harder to distinguish. Schools need to recognise this issue and introduce a bright coloured 'cycle sash' or jacket as a part of their uniform for cyclists. Driver awareness also needs to be addressed. Research has indicated that the number of cyclists using the road directly impacts on driver awareness of cyclists. More children cycling to and from schools would lead to greater driver awareness of cyclists.

Currently there are many effective child cycling safety programmes that are in operation under the guidance of interested parties such as schools and the Land Transport Safety Authority. However, it is necessary to develop these programmes further. Ongoing education is necessary to ensure that children retain the information, to reinforce the issue of safe cycling and to maximise the likelihood that safe cycling is practiced. Ongoing education could also allow these programmes to be developed further, focusing on more issues and extending the issues to address them in more depth. For example, children could benefit from education on driver behaviour. Regardless of the safety measures cyclists take, there will be times where motorists will not see them. Cyclists could benefit from being instructed on 'defensive cycling'. A programme focused on defensive cycling could help to minimise the risk of an accident with a motorised vehicle. Children could also benefit from more 'on-road' education. Child cyclists need to learn how to cycle safely with motorised vehicles and this would be an effective way to ensure they develop the appropriate skills.

Child cyclists also need to be aware of the road rules. The focus groups indicated that, regardless of having been involved in a cycle safety programme, many children do not possess an adequate knowledge of the road rules. Ongoing education would ensure that children retain and develop this information. A 'cycle code' based on the same objectives as the *Road Code* could be beneficial to child cyclists.

Educating children in regards to all aspects of road safety is extremely beneficial as children are our future drivers. Through ongoing learning children will develop the

necessary knowledge and skills as cyclists. This is beneficial as a majority of child cyclist will progress on to become future motorists.

The literature and fieldwork indicated that factors such as road engineering, safety provisions, motorist behaviour as well as cyclist and motorist education need further examination to minimise the risk to child cyclists. These child cycling safety issues have been identified and developed to shape the recommendations in the following chapter.

6. Recommendations

6.1 Caregivers

Caregivers should cycle with their child(ren).

- This will allow caregivers the opportunity to develop a sense of their child(ren)'s cycling ability and provide an opportunity to rectify any problems.
- This will also allow caregivers the chance to develop their children's skill at handling bicycles and get them confident riding amongst motorised traffic.

Caregivers should sit down with children and work out safe cycling routes.

- Working out cycle routes will assist in raising awareness of the hazards children may encounter while cycling.
- Practicing this cycle route with children will allow caregivers the opportunity to develop a sense of the level of cycling skill their child(ren) possess and as a result will indicate how much further cycling training their child(ren) needs.

Caregivers should check their child(ren)'s bikes regularly with the child(ren) present.

- This will raise awareness of features of the bicycle and will assist in ensuring the bicycle is safe thus maximising child cycling safety when on the roads.
- Caregivers should ensure the bicycle is also checked regularly by a professional.

Make sure children are not 'overloaded' when cycling.

- Caregivers need to monitor the amount of gear children are attempting to carry while cycling. Excess baggage can lead to less control of the bicycle increasing the risk of an accident.

6.2 Local, Regional and National Authorities

Designing cycle maps with routes to and from schools.

- Local, regional and national authorities will have access to a broad range of information regarding safe routes to and from schools. They can also then focus on 'cycle-heavy' routes for prioritising improvements to road surfaces, road junctions and roundabouts.
- Specific routes could possibly be graded in terms of their level of safety.
- This information should be provided free of charge to all caregivers who request a 'cycle map'.

Commit to improving road engineering to maximise cycle safety.

- Currently improvements are made to road surfaces and intersections as they are required and include cycle safety measures. Local and regional councils need to take the initiative to improve routes for cyclists, regardless of whether the road is in need of repair, to maximise the safety of cyclists.
- Local and regional councils need to develop a budget specifically for cycling so as to address the hazards facing cyclists.

Design a 'Road Code' for cyclists (one for 7-12 year olds and one for 13+).

- A Road Code for cyclists should be developed educating cyclists on general road rules, road signs and hazards.
- Two versions need to be designed, to cater for the abilities of different ages. A road code for 12 and under could address the more basic principles that are

required in order to cycle safely. The language must be simple to ensure that key concepts are understood by younger readers. The second road code should be developed for older cyclists. As the focus groups indicated, cyclists may not retain the information they are taught as young children and thus ongoing education is necessary.

The Road Code for motorists should include cyclists.

- Currently the *Road Code* for motorists does not adequately include cyclists. The *Road Code* needs to address cyclists as legitimate road users to raise the awareness of motorists.

Policing of cyclists' use of hand signals.

- Correct hand signals can maximise the safety of cyclists riding amongst motorised traffic. Local Authorities need to ensure that cyclists are using hand signals every time they make a turn on their bicycles.

Policing of motorist behaviour.

- Motorists have a responsibility to cyclists as their vehicles can cause serious damage, especially to a child cyclist. Speeding outside schools, not indicating and cutting off cyclists needs to be monitored by police to maximise the safety of child cyclists.

Take into account children's ideas and perspectives when making decisions that directly affect them.

- Children have a number of concerns when cycling amongst motorised vehicles (refer to Fieldwork). Local authorities may find children are a valuable resource when developing initiatives to maximise the safety of cyclists.

Communicate with schools when developing new initiatives in school areas.

- School employees will have observed the specific problems children encounter when entering or exiting schools on bicycles and thus may be a valuable source of information.

6.3 Children

Children must take responsibility for their learning.

- Children must ask questions if unsure about road rules or their ability to cycle amongst other traffic. They also need to lobby for schools to become involved in cycle safety programmes and approach their caregivers to help with cycle safety training.

Children need to obey road rules.

- Children often cycle on footpaths and up or down kerbs. They need to take the responsibility to ensure they are obeying all the road rules. If drivers of motorised vehicles are aware of the intentions of the cyclist, they will find it easier to drive safely alongside cyclists.

6.4 Schools

Develop a bright coloured uniform sash or jacket.

- Many school uniforms tend to be dull and designed in neutral colours and thus may be difficult for motorists and other road users to see, especially in Hamilton where fog is common. Schools with uniforms need to provide a bright coloured jacket, sash or vest for students to wear to ensure cyclists will be seen by motorists. Schools without school uniforms may also consider this as a valuable option to maximise the visibility of their child cyclists.
- By making bright coloured vests/sashes/jackets compulsory school staff will be able to monitor the child cyclists to ensure they are complying to this rule. Making these vests/sashes/jackets compulsory may also minimise the effects of negative peer pressure by other students.

Entrances for cyclists into schools should be off the main road to avoid heavy traffic areas.

- Schools need to provide off-road entrances for cyclists away from the paths of buses, cars and pedestrians. This will also provide a better environment to monitor child cyclists entering and exiting schools.

Schools should implement a 'cycle warrant of fitness' to ensure their bicycles are safe to ride. This could work especially well in conjunction with local bicycle shops.

- These checks could include a check that ensures that bolts are tight, the chain is tight, the handle bars straight and the wheels pumped up. The child could be included in this exercise. This may have two immediate benefits:
 1. Children will have the opportunity to learn about their own bikes and what constitutes a safe or unsafe bicycle.
 2. All children at schools that provide a cycle warrant of fitness will be riding safe bikes.

Do not overload students to and/or from school.

- Children carrying large amounts of gear and equipment can lose their balance when cycling (see above).

Schools need to provide ongoing child cycling safety education programmes to develop and maintain marked improvements in cycling skills.

- Educate cyclists on how motorists use roads. For example, cyclists cannot presume staying left will keep them safe or drivers will act according to road rules. Thus there is a particular need for child cyclists to learn about defensive cycling practices.

7. Conclusion

This report has investigated the issue of child cycling safety. The research has focused on children cycling in urban areas, specifically to and from school. The purpose of this report is to provide grounded research-based recommendations for caregivers, children, schools and local authorities. It is intended that this report has the potential to maximise the safety of child cyclists.

Taking both a qualitative and quantitative approach this research has:

- Identified through a literature review and interviews the current practices, programmes and strategies that are implemented to maximise child cycling safety.
- Identified through a literature review, focus groups, questionnaires and an observation exercise, the current hazards that child cyclists encounter.
- Provided recommendations to reduce the risk to child cyclists and maximise their safety when cycling on New Zealand roads.

The findings in this research have been largely based on information procured in the Waikato region, however they are thought to be applicable on a nationwide level.

This research has indicated that motorists lack awareness of child cyclists and thus do not share the roads adequately. This has the potential to endanger child cyclists and must be addressed immediately. It was also found that intermediate and high-school aged cyclists do not possess an adequate knowledge of general road rules and cycling skills. This can be addressed through ongoing cycle safety education programmes that provide on-road cycling safety education. Caregivers must also have greater input into their child(ren)s cycling education. Cycling with children will provide caregivers with a sense of the level of cycling skill the child(ren) possess. Finally, this report found that local authorities need greater commitment to developing and implementing cycle safe roads to maximise the safety of child cyclists.

Child cyclists will one day be motorists. Adequately educating child cyclists will assist in developing the appropriate skills and awareness to prepare our future motorists to share the roads safely with other road users.

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Rowan Balloch and Kyro Selket of the Department of Sociology and Social Policy at the University of Waikato invite you to complete the following questionnaire on Safer Cycling for Urban School Children. The Child Accident Prevention Foundation of New Zealand is supporting this project. This research aims at minimising the risk of harm to child cyclists in Hamilton.

Q1. Does your child cycle to school?

- Always (If 'always', 'usually' or 'sometimes' please go to Question 2) Usually Sometimes Never (If 'never' please go to Question 6)

Q2. In what way could child cycling safety be improved?

- More cycling lanes Education of drivers
 Better child safety education Cycling lanes separated from roads
 More child safety education More money spent on upgrading roads
 Other _____
-

Q3. Has your child participated in some form of safe cycling programme?

- Yes (If 'yes' please go to Question 4) No (For those who answered 'no' or 'don't know', thank you for participating in this survey) Don't Know

Q4. Which safer cycling programme has your child participated in? _____

Q5. Did you see any changes to your child's cycling behaviour after doing a safer cycling programme?

- Yes, a marked improvement Yes, some improvement No improvement Other

Further comments: _____

Q6. What are the three main reasons for not letting your child cycle to school? (Rank 1 – 3, 1 = most important)

- Roads are unsafe
- Live close enough to walk
- To young to bike yet
- Other _____
- my child does not own a bike
- live too far away to bike
- not enough cycling lanes
- too many main roads to cross

Q7. Would you allow your child to participate in a safer cycling programme?

- Yes
- Don't know
- No (please comment below)

Comment: _____

Q8. If your child participated in a safer cycling programme would this encourage you to let your child ride her/his bike to school?

- Yes
- No (if 'no' please comment below)
- Possibly (if 'possible', please comment below)
- Don't know

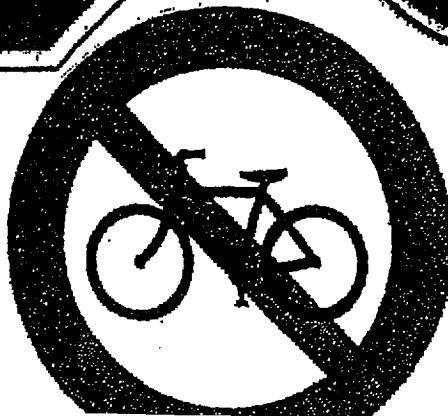
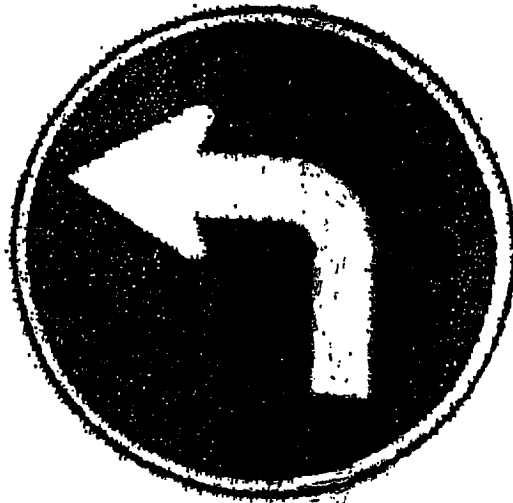
Comment: _____

Q9. In what way(s) do you think child cycling safety could be improved?

- More cycling lanes
- Better child safety education
- More child safety education
- Other _____
- Education of drivers
- Cycling lanes separated from roads
- More money spent on upgrading roads

Further comments: _____

APPENDIX 2



APPENDIX 3

