C. A VARIETY OF POSSIBLE FUTURE ACTIVITIES

8.0 SUGGESTED COUNTERMEASURES AIMED AT REDUCING CHILD ROAD ACCIDENTS

This lengthy section of the report attempts to put forward a range of possible countermeasures aimed at reducing the incidence of children in road crashes. It begins with an overview, including a schematic summary of the suggestions to be developed. The issue of 'safe' behaviours as goals or objectives is proposed following on recommendations in section 7.3. Implementation of Road Safety programs is included because of its critical importance. The lack of documented information on implementation belies its importance.

A range of countermeasures are suggested, including a rationale for each, based upon the analysis in this review.

FIGURE F

COUNTERMEASURES CONSIDERED IN SOME DETAIL

*CHILD RESTRAINT CAMPAIGN (Mass Media)
(incorporating personal driver responsibility)

Impact - child passengers, young drivers, youth occupants, adult drivers.

Ingredients - enforcement, mass media, legislation, education special material for secondary school children

*ADULT/CHILD PEDESTRIAN CAMPAIGN (Mass Media).

Impact - child pedestrians, young drivers,
- adult pedestrians, adult drivers.

Ingredients - T.V. campaign (series of commercials aimed at parents)

*PEDAL CYCLIST-"BIKE ED" AND HELMET WEARING

Impact - child pedal cyclists
- adult drivers

Ingredients - increase supply and demand for Bike Ed by community involvement
- increase accidents of helmet usage and have way for legislation

*GRADUATED LICENSING-RESTRICTION OF PASSENGERS

Impact - child passengers, youth passengers
- child pedestrians and pedal cyclists
- young drivers, adult drivers
- adult pedestrians

Ingredients - Legislation, media campaign, enforcement

*CHANGE STATUS OF RESIDENTIAL STREETS

Impact - child pedestrians, pedal cyclists
- young drivers, adult drivers
- Local council

Ingredients - Legislation, engineering, mass media, enforcement

*TOWN PLANNING/ENGINEERING-LOWER VEHICLE SPEEDS

- all drivers
- child pedestrians and pedal cyclists

Ingredients - Engineering/Town Planning, Local councils

*EDUCATION-PRESCHOOL

Impact - child pedestrians
- parents(mothers)

Ingredients - Pre-school teachers and parents
- behaviour change techniques

*EDUCATION-PRIMARY

Impact - child pedestrians, pedal cyclists, child vehicle passengers

Ingredients - Roadworks
- ABC Education TV Program
- development of video-tape programs

*EDUCATION-SECONDARY

Impact - child pedestrians, cyclists and passengers
- young drivers and teen passengers

Ingredients - N.Z. Roadshow
- curriculum units

*CHILD TRAINING HARNESS

Impact - pre-school pedestrians
- mothers
- drivers

Ingredients - Design innovations, mass media support

*VEHICLE REVERSING WARNING SYSTEM

Impact - child pedestrians
- child cyclists

Ingredients - Legislation, design rules

*COMMUNITY AGENDA SETTING

Impact - all categories of road users including drivers

Ingredients - publicity
- existing T.V. serials
- direct mail via schools

8.1 An Overview

This section of the report attempts to put forward some alternatives for future action. It is based upon as thorough an analysis of the existing state-of-affairs as is possible, given the nature of the problem and the available data. The purpose of this section is to critically examine a wide range of countermeasures, many of which are not new. The countermeasures are most appropriately viewed as one element in a long term program aimed at reducing the incidence and severity of road crashes involving children 0-16. These countermeasures emerged out of the analyses from the previous chapters and, as such, represent the author's suggestions for further detailed consideration by relevant road safety authorities.

The list of suggestions is not exhaustive and no doubt many additional countermeasures could or should also be considered. For the sake of parsimony each of the suggestions which follow are included because it is believed they could have a sizeable impact on a particular road user group. Some of them reflect a desire to think beyond the existing bounds.

Clearly, some suggestions are more practical than others; some are more cost efficient than others, some are more easily and quickly implementable than others; some will have major impact on specific groups of road users whilst others have a smaller impact on a wider range of road users; some will impact immediately others over a longer period.

In order to provide a framework in which to judge the suggested countermeasures, Figure F, opposite, summarises the main countermeasures considered for inclusion in this section of the report.

Whilst the suggested countermeasures are alternatives, it should be recognised that they are complementary approaches. They each have a part to play in the chain of events needed to make substantial reduction in the incidence and severity of road crashes involving children 0-16.

The report of the Slough Experiment (Ministry of Transport and Civil Aviation, 1957) conducted almost 20 years ago serves as a useful reminder:

> "2) The Experiment has served to demonstrate the value of bringing a combination of both educational and engineering measures to bear on the accident problem. In education, both propaganda and training have an important part to play, and a significant role can be played by the police. Indeed, the part of the police in accident prevention is of utmost importance.....

"If a measurable impact is to be made on the problem of road accidents .... considerably greater resources must be made available for this work. These considerations apply both to the educational and engineering aspects, as well as to police activities.

"6) .... The Experiment has given strong indications that concentration on specific lessons is more immediately profitable than generalised pleas for greater care." (Ministry of Transport & Civil Aviation 1957, p.65).

8.2 The Importance of Safety-Related Behaviours

It is not possible to compare the likely possible effects of the various countermeasures to be considered in the following pages. However, it is important to carefully define goals and objectives for each. Furthermore, these goals ought to be related to the ultimate objective of the implementation of such countermeasures. Accident reduction is the ultimate objective. However, most countermeasures cannot be assessed by such a criteria. In many instances such a criteria is unrealistic because of the interplay of a multifarious group of factors which operate in the real world. Of equal importance, is the need to understand that a countermeasure is usually designed to bring about changes in road safety behaviours.

Advertising, in the marketing world, is correctly judged in terms of communication objectives or goals, not profits or sales, which are marketing objectives. Advertising (communication) is but one part of the total marketing mix, which, in total, is designed to bring about specific behaviours in the target audience. Sales is not an appropriate measure of advertising but is an appropriate measure of the total marketing mix.

Road safety communications (mass media, educational programs) are most appropriately assessed in terms of behaviours, not in terms of accident reduction. A road safety countermeasure can be deemed to have been effective if it brings about an increase in the desired behaviours; i.e., safety-related behaviours. These behaviours ought to be have been proven to be related to safety; e.g., wearing restraints, stopping before crossing a road, etc., etc.

The great majority of educational and mass communications countermeasures in road safety have not been demonstrated to have been successful in preventing or reducing road accidents. Why? Because such an objective is unrealistic. Safety is behaviour, not an attitude, nor a state of mind. Educational and/or training programs should aim to get road users to adopt safe behaviours rather than simply to increase the knowledge of safety

or to change their attitudes. In contemporary advertising and psychological research, attitudes are regarded as the result of behaviour, not the cause of behaviour.

Embry (1984) argues that pre-occupation with attitudes and knowledge has resulted in an over-emphasis on educational programs which, in turn, has not achieved much success (see Robertson, Kelley, O'Neill, Wixom, Eiswirth & Haddon 1972).

> ".... the misplaced emphasis on attitudes and knowledge about safety has necessarily resulted in the choice of countermeasures - curriculum design - inappropriate design, emerging from school settings where the goal is to train knowledge, has been applied to a task that it was never intended to do. Not surprisingly, curriculum design fails to change safety behaviour and accident rates. We could heap sarcasm on curriculum design, a pointless critique of the wrong tool. We should not blame the screwdriver if it fails to undo the spark plug from the engine block; it was just the wrong tool.
>
> "Presently, specialists, public-relations people, and safety experts toil away creating safety education interventions. In good faith and with good intention, they prepare the messages relying on the aesthetics of curriculum design, which insures that the intervention is aimed at people's knowledge and attitudes - because curriculum design has emerged from issues about knowledge and attitude in school settings." (Embry, 1984, p.4)

8.3 The Critical Role of Implementation

Road Safety programs exhibit a wide range of sophistication in terms of development and assessment. Considerable attention is often given to the scientific literature in developing strategies or campaigns. Similarly, assessment is likely to employ the survey or experimental method. There is a very substantive body of literature relating to both development and assessment.

The fact is, that no matter how well a road safety program has been prepared, in the final analysis, the outcome is largely dependent on its implementation. No matter how sophisticated the assessment methodology, the outcome reflects both the program and its actual implementation. Regrettably the literature on implementation is sparse. Whilst some detailed case studies do exist, they tend to emphasise the theory and the development of the campaign materials/messages and/or the assessment methodology and/or outcomes (e.g. Elliott & South 1985).

All road safety programs require some form of implementation. The best laid plans sometimes flounder because they are not implemented as their creators intended. In road safety programs, dealing with children in particular, there is a dearth of literature in relation to implementation. The detailed account by Milne, Wolski, Polglaze & Scully (1982) reflect the norm ("The Development and Evaluation of an Effective Road Safety Campaign". The same holds true for the detailed accounts by Freedman and Lukin (1981), and Rothman & Kearns (1985).

When road safety programs are evaluated, it involves the total program including the implementation. Perkins (1984) argues that we make a false distinction between program development and program implementation:

> "The argument is based on the concept of what an independent variable is. In this context the independent variable is not only the program that has been developed for us it is also the delivery mechanism where the specific program is spread through the community. What normally happens is that during the process of developing the program the designer assumes the role played by the delivery mechanism and disguises it. He or she organizes people, print materials, delivers them and display boundless amounts of enthusiasm and insight. No wonder programs fail when given to a busy and/or uninterested teacher or parent." (Perkins 1984, p.2).

Implementation is critical. Campaign designers all too often ignore it to their peril by assuming it will all happen. Experience demonstrates it is unlikely to happen the way planners hope. Thus, in designing any road safety program it is vital to include detailed plans and options with respect to implementation. Perkins' (1984) paper provides some sound suggestions for the creators of road safety programs to consider, rather than ignoring the implementation of their masterpieces.

8.4 Key Recommended Countermeasures for Each Child Road User Category

There are a three major road user categories involving children which require initiatives in order to eventually reduce road accidents involving children 0-16. This sub-section of the report recommends key countermeasures aimed at the specific problem or behaviours for each of the three categories of road users. These countermeasures are recommended for further consideration. In subsequent sections of this chapter additional countermeasures are proposed which also impact on all or some of these three road user groups.

8.41 Vehicle Occupants Motor Vehicle Restraint Use - Mass Media Campaigns

In the three most populous states passengers, as a road user category, account for almost half of all road accident victims for children 0-16 in metropolitan/urban areas and for almost two thirds in country areas. For Australia as a whole vehicle passengers (in 1980) represented 45% of fatalities and 47% of injuries involving children 0-16. The incidence of children in crashes with or without restraints is not known with any degree of accuracy as indicated in subsection 4.325. However, it is likely that in almost one in every 2 child occupant deaths no restraint was worn.

Of all the countermeasures available the wearing of child restraints or adult seat belts could have the greatest effect on the reduction of severity of injuries. According to Lane, Milne & Wood:

> "The use of restraints has long been accepted as one of the most effective methods of reducing injury and death on the road. Since the introduction of legislation in 1970 making it compulsory to use restraints the number of vehicle occupants killed or injured in road crashes has steadily decreased. However, it is evident that these gains have been achieved primarily for drivers and front seat passengers and little change has occurred in rear seat passenger injury and death rates." (Lane, Milne, & Wood, 1983, p.1).

Brittain & Sheffi (1982), in a review of the costs and benefits of motor vehicle passenger - safety systems and policies, argue that a mandatory seat-belt use law is more cost effective than passive seat belts (automatic no buckling) or air bags. They claim that the effectiveness of the standard seat belt system can be calculated and is estimated by various sources at around 70% when activated. In the U.S.A. wearing rates are only around 10 percent.

McKnight & McPherson (1982) argue that:

> ",... the use of occupant restraints represents the single most valuable way of reducing traffic injuries and fatalities." (McKnight & McPherson, 1982, p.55).

The value of seat belt use is recognised in the U.S.A. judicial system even though only one in every ten Americans use them.

> "The effectiveness of seat belts is clearly established from the many studies on the subject. The disadvantages of wearing seat belts appears to be negligible." (Green & Sharpe, 1982, p.57).

Green & Sharpe argue that even in jurisdictions without seat belt legislation, the common law over the past two decades has been increasingly recognising that the failure to wear seat belts constitutes contributory negligence. With respect to child-restraint systems, they point out that:

> "Where a parent with a young child improperly places the child in a system or does not put the child in one at all and is involved in a collision, even though the collision may be entirely the fault of someone else, the defendant will have available the seat belt defense to the extent that the injuries suffered by the child may be directly attributed to the improper use or the failure to use the child-restraint system." (Green & Sharpe, 1982, p.61).

A sizeable proportion of children injured as passengers in motor vehicles were unrestrained. This reflects the low level of wearing rates, especially in the rear seat.

Milne (1980) in a survey conducted in September 1980 established that, in Victoria, the seat belt wearing rate was only 19% in the rear seat compared with 85% for the front seat. Milne found that rates of wearing in the rear seat were low for all age groups including children and adolescents, and especially teenagers 14-19 years.

Boughton (1982) pointed out that availability of child restraints was not very high:

> "specially designed child restraints are provided for less than one-third of children travelling in cars. Even with the inclusion of seat belts (which are designed to fit the 50th percentile six-year-olds), only about two-thirds of children had a restraint available." (Boughton, 1982, p.21).

Apart from the availability problem, attitudes in the community have not favoured the use or enforcement of child restraints. Freedman & Lukin (1977) found that mothers restrain children because of benefits to the mother and not because of increased safety to the child. <u>According to Milne (1979), an important ingredient in the success of seat belt wearing (adults) was Police enforcement</u>. Boughton (1982) argues that discussions with Police in N.S.W. and Victoria indicate that no child-restraint enforcement campaigns had been undertaken up to end 1981. Boughton concluded:

> "In view of the lack of enforcement, and of mother's attitudes towards the restraint of children, it is not surprising that the child-restraint legislation has not been effective in significantly reducing casualties." (Boughton, 1982, p.21).

Wittingslow (1983) as a result of a survey of Melbourne school children in 1980, found that claimed wearing rates were 40% for 9-11 year olds and 31% for 12-14 year olds (secondary school students). He concluded:

> "The actual wearing rate of the children and the suggested wearing rate if belts were not compulsory was 35% - this is consistent with other overseas studies where it is not compulsory to wear safety belts. All this evidence strongly supports the argument that the only way to significantly increase the community wearing rate of seat belts is to strictly enforce compulsory wearing of seat belts." (Wittingslow, 1983, p.27).

There is ample evidence to suggest that a range of measures is needed to bring about higher child restraint wearing rates amongst both younger children and teenagers. One necessary ingredient is enforcement. To assist this process it may be necessary to enact legislation to make the driver legally responsible for the wearing of seat belts or child restraints (where available) for children under 18 years of age or indeed for all passengers in the vehicle. Only then, can the Police expect to enforce the legislation. It is unreasonable of any society to expect the Police to serve infringement notices on children and/or teenagers.

In examining child restraint legislation it is vital to recognise that the problem of vehicle occupant accidents is not only a problem for the younger child. Across all age groups (0-16) vehicle passenger injuries are the single biggest category of road user injuries. In percentage terms, the incidence of passenger injuries increases as age increases between 0-16. Thus, whilst there is a concern about child restraint usage there is an even greater need to increase seat belt wearing amongst older children (8-12) and young teens (13-16). As mentioned above, the lowest wearing rates are for the 14-19 age group (Milne, 1980). Boughton (1980) provides a listing of wearing rates for children for roadside surveys in each of the states. (Boughton 1980, table 4, page 14). An attempt is made in the following pages to provide up to date information for the three most populous states.

8.411 N.S.W.

The Traffic Accident Research Unit (TARU) conducted a number of surveys between August 1970 and July 1981. A code was used for a child under 8 (estimated). Schnerring (1983) reports over the period;

- that wearing rates in N.S.W. have decrease since 1976,
- rear occupants have a much lower rate than front seat occupants,
- rural areas have lower wearing rates than the Sydney Metropolitan area.

No tables are supplied for age.

According to Freedman & Schreiber (1975), TARU observation studies had revealed that the proportion of child occupants (under 8) who are restrained is around 25% compared with adults (75%). Freedman & Lukin (1977) in a household survey of Sydney mothers of children under 8 found in 1975 that

- few infants (under 6 months) were restrained,
- the large majority of children 6 months to 3 years were restrained in approved seats on most car journeys,
- few children between 3 years and 8 years used child restraints or seat belts yet seat belts were often available.
- children of all ages and especially infants were sometimes carried on mother's lap in the front passenger seat.

As a result of changes in the legislation and a mass media campaign, Freedman & Lukin (1981) reported that between July 1979 and August 1980, availability of restraints for children under 8 had increased from 78.9% to 81.3% (availability of adult seat for child over 1 year was counted) whilst usage rose from 39.8% in July 1979 and 55.4% in February 1980 (2 months after the campaign). The August 1980 survey revealed the increased wearing rates had been sustained.

In N.S.W. the National Roads and Motorists' Association (NRMA) have conducted surveys of child restraint usage. Fleming (1981) reported, as at November 1981 in Sydney Metropolitan Area, that over 97% of children under 8 had some form of restraint available. The NRMA surveys have shown that usage rates amongst children are on the increase in Sydney.

TABLE 84 NRMA OBSERVATION STUDIES
VEHICLE RESTRAINT WEARING RATES IN SYDNEY

	1979	1981	1983
1/2 - 4 years	69.4	80.9	77
4 - 7 years	24.9	42.5	46

Source: Fleming (1981), Booth, (1983).

The latest NRMA Survey November 1983 (Booth, 1983) reveals that wearing rates are still low in the under 8 age group and that the youngest age group has recently shown a decline. The movements in these figures ought to investigated further. Are they reflections of reality or of methodology? In respect to the latter, observational techniques have a unique set of biases. The estimation of age is also subject to considerable error. In addition, the data refers only to weekdays and Shopping Centres and within school hours. It must be noted that fatalities, involving child occupants, peak at weekends (see 4.312 and 4.3222).

In an effort to publicise the problem, the April 1984 issue of 'Open Road' (NRMA) mentioned the alarming number of children at major risk e.g. 106 unrestrained in the front passengers seat (43 sitting on mothers lap); 62 standing on seats or on the floor of moving vehicles, etc.

8.412 Queensland

In December 1979 Queensland passed laws relating to the compulsory use of restraints by children under the age of 8 years when such restraints were available. Wadley & Cantemessa (1983) report that availability and wearing rates increased between December 1979 and June 1980.

TABLE 85 RESTRAINT AVAILABILITY AND USAGE IN BRISBANE

	December 1979	June 1980
Restraints Available		
Front	88.7%	94.8%
Rear	88.1%	93.4%
Total	88.3%	93.7%
Restraints Used		
Front	28.0%	44.2%
Rear	32.0%	45.9%
Total	30.9%	45.5%

Source: Wadley & Cantemessa (1983).

The Queensland data was collected at Shopping Centres, Schools and Kindergartens. The wearing rates varied somewhat between centres. Furthermore, when compared with adults the child wearing rates are very low.

Wadley & Cantemessa conclude that one in every two children under 8 are still unrestrained despite legislative changes. They found no movement from front to rear seating between the two surveys.

Another significant result of the Queensland studies is the lower wearing rate in the older age group (i.e. school age) compared with kindergarten age children.

TABLE 86 WEARING RATES IN BRISBANE 1980

	Shopping Centres		Schools		Kindergartens
	Child	Adult	Child	Adult**	Child
Front	51.1%	86.1%	39.0%	75.2%	45.9%
Rear	59.0%	45.8%	27.4%	9.1%*	56.8%
Total	57.4%	84.6%	30.7%	73.5%	54.6%

Source: Wadley & Cantemessa (1983).
* Very few observations
** Adult data only supplied for schools and kindergartens combined.

Greenham, Pathe, Pitman & Salmon (1983) reported a study involving questionnaires, observations, retrospective survey of parents of hospital accident treated children. Their results suggest the following:

- parents overstate restraint usage (71% claimed usage),
- 45% of children were restrained,
- the 3-8 years age group had the lowest restraint usage (35%),
- children travelling with male drivers and unrestrained drivers had low usage rates, 37% and 21% respectively,
- most children (62%) involved in an accident requiring hospital treatment were unrestrained,
- most children injured had head injuries (65%).
- a need for more enforcement.
- a need for convincing public to comply and desire greater levels of enforcement.

8.413 Victoria

Lane, Milne & Wood (1983) provide usage rates across a broader age range than that available from N.S.W. or Queensland data. The data included surveys between October 1979 and November 1982. Over this period three known factors intervened which could have had a bearing on wearing rates:

- a publicity campaign "Belt Up in the Back" was undertaken including a Police "blitz";
- legislation was introduced requiring children under 8 years of age travelling in the rear seat to wear a restraint;
- a second publicity campaign "What About Me" was also put into effect.

The results of the surveys indicate dramatic improvements in rear seat wearing rates so that wearing rates in Victoria (Melbourne) substantially exceed that in N.S.W. (Sydney) or Queensland (Brisbane).

TABLE 87 PERCENTAGE OF USE OF AVAILABLE RESTRAINTS IN REAR SEATS

Age Groups	Early Oct. 81	End Oct 81	Nov/Dec 81	March 82	Nov. 82
0-7	65.2	70.4	76.5	86.0	90.9
8-13	31.0	42.1	54.4	63.3	80.5
14-17	28.4	37.2	51.9	51.9	68.4
All Persons	39.5	47.0	59.8	67.0	80.0

Source: Lane, et. al. (1983).

As indicated by Milne (1980) the 14-17 age group continued to have the lowest wearing rates over the period.

Using front seat occupant casualties as a control group, Lane, et.al. (1983) were able show a reduction in rear seat casualties (all ages) between the first six months of 1981 and 1982.

Manders (1983) in reporting the November 1982 results in full provided data by age by position in vehicle as at November 1982.

TABLE 88 PERCENTAGE WEARING RESTRAINTS

Position	Age 0-7	8-13	14-17	All Persons
		Male		
Driver				95.3
Front left	76.2	81.3	92.9	90.1
Rear Right	84.8	78.7	63.0	74.8
Rear Left	89.0	72.5	65.3	74.7
All Positions	86.4	76.6	74.6	92.11
		Female		
Driver	-	-	-	95.2
Front Left	72.7	81.6	86.0	91.2
Rear Right	90.9	73.3	62.2	74.2
Rear Left	84.5	73.6	59.3	71.5
All positions	86.5	74.8	68.3	90.08

Source: Manders (1983).

Whilst there is a tendency for older females (8-13) and especially (14-17) to be less compliant than males, the differences are not very great. The relatively lower wearing rates in the front seats by young people is also a concern; i.e., in comparison with adults.

Notwithstanding the differences between the age groups, the wearing rates after the changes mentioned above are considerably higher than in N.S.W. or Queensland in the youngest age group (the only data collected in these states).

Manders (1983) analysed wearing rates for three trip types based on site type. He found wearing rates were highest for rural trips (90.9%) and lowest for recreational trips (87.4%). Data by age is not included.

Lane, Milne & Wood (1984) claim that the success of the "Buckle-Up" campaign was due to a number of factors, including enforcement, a wide range of media and a research based program of development and evaluation.

Table 89 summarises the effects of the "Buckle Up" campaign over the four phases. Overall restraint usage increased for every age group and in every case the increase was statistically significant ($p<.001$). However, as in previous studies the teenage group appeared most resistant to the campaign.

TABLE 89 RESTRAINT USE IN REAR SEAT (AGE BY PHASE)

Age Group	Phase 1	2	3	4	Change in %	Nov '82
0-7	65.2	70.4	76.5	86.0	20.8	90.9
8-13	31.0	42.1	54.4	63.3	32.3	80.5
14-17	28.4	37.2	52.3	52.5	24.1	69.7
18-29	24.0	32.5	51.9	51.9	27.9	68.4
30-49	26.5	40.8	52.8	61.8	35.3	74.9
50+	43.0	55.7	60.0	72.1	29.1	83.2

Source: Lane, et al. (1984) Table III, p.12).

A very recent follow-up study by Manders (1984), has revealed that wearing rates declined between November 1982 and November 1983. The overall rates are still high in comparison with other states, but have shown a small decay since November 1982. The decay is somewhat greater amongst children, especially females. The rear right seat exhibits the most decay, especially amongst teenage girls.

TABLE 90 PERCENTAGE WEARING RESTRAINTS (VICTORIA) NOV. 82 AND MAR. 84.

	AGE 0-7		8-13		14-17		All Ages	
	82	84	82	84	82	84	82	84
Position				Male				
Driver	-	-	-	-	-	-	95	95
Front left	76	79	81	90	93	96	90	90
Rear right	85	89	79	55	63	61	75	64
Rear left	89	83	73	68	65	55	75	61
All Positions	86	85	77	67	75	67	92	87
				Female				
Driver	-	-	-	-	-	-	95	95
Front left	73	75	82	88	86	92	91	91
Rear right	91	69	73	59	62	36	74	59
Rear left	85	83	74	51	59	55	72	61
All positions	87	77	75	59	68	58	90	85

Sources: Manders (1983); Manders (1984).

8.414 Recommendations - Restraint Usage Campaign

1. Victoria has demonstrated that historically accepted low levels of restraint usage by children 0-16 can be dramatically increased. N.S.W. and Queensland demonstrate that legislation alone will not bring about substantial increases. In N.S.W. (Freedman & Lukin 1981) demonstrated a small increase in the 0-8 age group but still low in comparison with the Victorian results. Low usage rates can be substantially improved.

2. Legislation or mass media campaigns or enforcement carried out individually are unlikely to result in substantial increases but all three carried out in concert can bring about relatively lasting effects (Milne, 1982).

3. Efforts to bring about legislation which makes drivers personally liable for child passengers (under 18) is likely to aid the enforcement process and increase wearing rates. There appears to be wide community acceptance of mandatory restraint laws (Trinca, 1982).

4. The success of the Victorian campaign efforts (in total) warrant due consideration be given to other States adopting the campaign in total.

5. The decay in Victoria, whilst small, is a salutary reminder of the ongoing task facing road safety authorities (Elliott, 1980a).

6. The low incidence of usage rates and the high incidence of child vehicle occupant accidents warrants special efforts being devoted to means of increasing wearing rates. Some information exists in relation to attitudes of parents, drivers, and child occupants with regard to child restraint non-usage (Freedman & Lukin 1977, 1981; Greenham, et.al. 1983; Elliott, 1980b; Wittingslow, 1983).

7. Since the problem of non-compliance is greatest in the high school age students (Milne, 1980), there is merit in considering special efforts aimed at this target group. Not only should they be studied in more depth (Elliott, 1980b; Wittingslow, 1983) but attempts at developing specific communication approaches could be considered for use in schools. McKnight & McPherson (1982) attempted to measure the effects of four instructional approaches to occupant-restraint using four high schools in St. Louis, Missouri.

They concluded that it is possible via in-school programs to influence usage rates and that communication of factual information about restraints and the risks associated with failure to use them are necessary elements in any such program. Whilst many differences clearly exist between Australian and American teenagers and schools, the success claimed in the McKnight & McPherson (1982) study warrants further investigation.

8. In sum, the following countermeasures ought to be considered:

* legislation requiring driver responsibility for restraint usage by all occupants or at least all occupants under 18 years of age.

* a roll-out of the Victorian campaign nationally (to all States with child restraint legislation) involving mass media campaigns and enforcement. The effects ought also be noticeable on adults in rear seats.

* efforts are required every 2 or 3 years to maintain usage rates a high level once higher levels are achieved.

* special in-school material could be prepared for teenagers relating specifically to restraint usage.

* the involvement of the Police in enforcement (even if "Bookleted" as in Victoria is the extent) is crucial. This will best be achieved if backed by legislative changes (driver responsibility) and mass communication efforts to create public awareness (which helps legitimise Police enforcement).

* Material for Police to hand out which provides explicit guidance on how to get passengers to comply and wear a restraint.

8.42 Pedestrians - Adult/Child Pedestrian Mass Media Campaign.

A number of publicity campaigns have been launched in an effort to combat child pedestrian accidents. In the U.K., a campaign was devised to launch the new Green Code. It went for three months from April, 1971 and was aimed at parents through the press and television and at children through television, posters, cinema and brochures. The brochures included a road crossing proficiency test undertaken by the child under parent supervision, and allowed the child to receive a proficiency card. Of the seven million brochures distributed, only 100,000 cards were issued.

The evaluation of the program (Singh, 1982) showed a small increase in children's curb stopping behaviour from 41% and 44%, looking both ways from 50% to 54%. Knowledge about what to do also increased, 'cross in a straight line' from 21% to 54%, look all around (specific to Code) 0% to 17%, look to the right, left, then right again (traditional drill) fell from 75% to 53%. There was a reduction in the number of accidents to 5-9 year olds of 11% but only in the period of a the campaign and for a short while after. It could well be argued that the behavioural changes were minimal and could be due to measurement error. Further such changes could reflect the behaviour of the adults rather than the children.

A campaign entitled 'Give them a hand' was launched in 1979 by the Dutch Government (Polak, 1980) which was aimed at parents, teachers, children (primarily 6-12 years old) motorists and local government authorities. It was designed to convince educators of the need for road safety education, show children how vulnerable they are and make adults realize that children behave as children in traffic. No report on its effectiveness can be found.

'Crossing Roads Isn't Childs Play' (see Rothman & Freedman 1982) was a campaign launched in N.S.W. whose main objective was to educate drivers (especially young males) about the unpredictability of children and to increase the amount and quality of supervision of children in the traffic environment.

Males under 30 years of age have a concept of good driving which is not related to safe or cautious behaviour. Mothers of young children were aware of the problem children had and they themselves were not good models and often cut corners when rushed. The campaign consisted of radio, magazine and bus advertising.

A post campaign evaluation (Rothman & Freedman 1982) showed that there was a reduction in the number of accidents, although not in the under 30 male driver category. The reduction was probably due to the increased parental supervision and general driver awareness. Rothman & Kearns (1985) post campaign analysis also shows that young male drivers who had seen the advertising, remain unaffected.

Cameron (1984) argues for the need to treat the child pedestrian problem as an adult problem. Whilst children have a higher accident rate, in sheer numbers of deaths and accidents adults are far more significant in morbidity and mortality numbers. He argues that pedestrian campaigns in Victoria aimed at children or adults, whilst not extensively evaluated, appear not to have had any impact on pedestrian fatalities. He suggests that adults probably perceive that they are not at risk and thus publicity aimed at them is unlikely to be effective. Cameron puts forward

the suggestion that a campaign directed at adults, but concerning the safety of children on roads might also increase adult awareness of their own safety as pedestrians. Those aspects of child pedestrian safety he suggests to be communicated are:

> "- the need to teach children to stop at the kerb and look for suitable gaps in traffic;
> - teaching children which places are safe or unsafe to play or to cross;
> - the danger of running onto roads, even minor roads close to home;
> - the importance of using crossing facilities;
> - that children cannot be expected to use the same crossing strategies as adults; that is younger children in particular are not able to assess traffic whilst approaching the kerb, as adult do."
> (Cameron, 1984, p.19).

It must be noted that Cameron's suggestion has considerable merit since some of the aspects of child pedestrian safety apply to all pedestrians:

- use of crossing facilities when provided;
- obey traffic control signals;
- give sufficient attention to road crossing, especially where no traffic controls are present.

8.421 Recommendation - A Campaign Aimed At Adults About Child Pedestrian Safety

1. The recommendation is for a mass media campaign aimed at parents but depicting the safety problems of children as pedestrians. The aim of the campaign is two-fold. To directly convince parents of the dangers in children crossing roads and their need as parents to get involved. At an indirect level the campaign could convince all persons (adults included) that crossing roads is hazardous. From the viewpoint of the parent the campaign will aim at parents as (a) role models when acting as pedestrians, (b) drivers, and (c) as educators of their children.

2. As Cameron (1984) argues, adults most likely don't believe they are at risk. The merit of this countermeasure is that it potentially could communicate correct behaviour to adults, parents, children whilst also making drivers more aware of children as pedestrians.

3. A campaign would require a variety of messages covering a range of activities and not just one television commercial as has too often been the practice in the past.

4. Any such campaign ought to be capable of being used over time and across all major metropolitan areas.

5. The purpose of this volume is not to provide a detailed brief to advertising agency. Before the suggested campaign can be contemplated, such a brief is needed and must be based on further research, especially amongst parents.

8.43 Pedal Cyclists - "Bike-Ed" and Helmet Usage

8.431 "Bike Ed"

In terms of available statistics, bicycle accidents represent the third most significant cause of injury or death on the roads to children. The statistics suggest that the problem is relatively small when compared with accidents involving vehicle passengers or pedestrians. However, as indicated in section 1.4 the extent of unreported bicycle accidents is extremely sizeable. At its extreme, the level of unreporting is 30 to 1 according to the Geelong Bike Plan. The essential point is that bicycle accidents are much more common than accident statistics reveal. Chlapeck et.al. (1975) claimed that hospital records and police reporting accounted for 5% and 1% of all bicycle accidents causing any injury or bicycle damage.

The problem of data collection in child bicycle road accidents has been alluded to in section 1.6. Bicycle accident data is notoriously unreliable. Triggs, Meehan & Harris (1981) recommended the need for changes in Victoria; mandatory reporting of all bicycle injuries sustained on roads; the desirability of national injury monitoring schemes based on casualty departments of hospitals; and the need for exposure data.

In reviewing the literature on child road accidents, the size of the literature relating to bicycles or pedal cyclists is small in relation to pedestrian or vehicle passengers. Analysis of accident statistics reveal that the problem can be defined as:

- males
- 8-16
- metro/urban bias

Bicycle training shows a mixture in its level of effectiveness. Part of the problem is that some of the measurements are made on the child knowing he is being observed and others not, while some are on accident data of trained and untrained cyclists. Wells, Downing and Bennett (1979) looked at on and off road training for 8-10 year olds. Both methods were effective at reducing the number of errors but those road trained were much better, even 6-8 months after training. The worst group were the eight year

olds, errors in looking for traffic were made by the playground trained group and not the road trained group. The authors concluded that age was the major factor in performance on a cycle. All the cyclists knew they were being tested.

A similar study was conducted in Newcastle by Trotter and Kearns (1983) comparing on and off road cycle training. They found that riding knowledge between pre and post tests increased by 78.7% for those trained off road and 83.8% for those trained on road. In riding performance there was an increase of 98.2% for off road and 100% for on road, again the measurements were made while the cyclists knew they were being observed.

Preston (1980a) compared the accident rates of those who had passed versus those not undertaken a Cycling Proficiency Training (CPT) scheme. Most children undertake CPT at around 10 years of age although some start younger. The percentage of males who had accidents having passed CPT was 44% while those who had failed CPT was 70%. This may reflect some difference in personal characteristics between the two groups, but no such research was carried out into the differences between the two groups.

The bicycle accident problem is not restricted to the roads. Those who analyse hospital records rather than road accident statistics find that the bicycle accident problem is much wider than 8-16 year olds and roads. Gonski (1979) and (1983) in looking at the findings of her hospital data for 1977-78 argued that existing schemes to teach children proficiency in bicycle riding neglect (a) young children (5-9) which represent half the hospital treated accidents, and (b) riding skills for potentially dangerous situations away from road or traffic. The most recent analysis of hospital data (Child Safety Centre, 1984) also reported that, as far as hospital treated bicycle accidents are concerned, half of the problem would be ignored by current schemes which start from ages 8 to 10. Their data included 261 bicycle accidents of which 47 were pre-schoolers (0-4), 61 infants (5-7); 107 primary (8-11); and 46 were 12+ years of age. Of the 261, 203 were males (i.e. almost 80%). A sizeable number (43%) were not road related and only 21 were involved with cars. Of course, this raises the question should Road Safety Authorities be interested in these off-road accidents? If the answer is in the negative, then who will be interested in them?

Despite the pleas of Gonski (1983) the reality is that on the roads most accidents do not involve children under 8 years of age. This could be due to less exposure since it is likely that many parents express concerns and do act to minimise road bicycle activity in the younger age groups. Furthermore, some primary schools ban the riding of bicycles to school. It is true, nonetheless, that sizeable numbers of pedal cyclists began riding

at young ages (Campbell, Foley & Pascarella, 1971). Arnberg, et.al. (1978) reports that 70% of children 5-13 riding bicycles began riding two-wheelers at 4 to 5 years of age.

To some degree, the problem of pedal cyclists is one of maturation. The Arnberg, et.al (1978) study revealed that the most important factor in determining cycling ability was age. Another important factor was frequency of use, although most cycled daily. Despite this high level of frequent use only the 13 year olds could manage all of the tests well. The children under 8 performed very poorly in most of the tests. They questioned whether children under 8 ought to be allowed in traffic at all. Similar views are expressed by Feros (1982) who suggests age 9 and the City of Santa Barbara California (1975) age 13 and Lee (1981) age 12. The Geelong Bike Plan (1977) recommended against a minimum age for bicycle riders.

It could well be argued that a proper training scheme could alter the results of studies like Arnberg et.al. What the situation might have been remains an interesting but answered question. At the moment, there is a substantive body of opinion that the instructional courses ought not to begin before age 8 and preferably not before 10 years of age. (Pascarella, et.al. 1971). The motives behind such a view aim at keeping your children on bikes off the road. Whilst such an approach may be desirable, it may still be necessary to provide parents with some practical guidance as to what to teach these young riders. Spike's Bike Book (For Parents of Little Kids under 9) provides a starting point.

It is generally agreed that training in some form or another is needed if cyclists are to survive in the road system. This training should involve traffic rules and riding techniques.

According to the HORSCORS (1978) report on Motorcycle and Bicycle Safety, the idea of training seems to have considerable face validity but there is no conclusive evidence that such schemes reduce the number of accidents. The Committee noted that the Geelong Bike plan would be evaluating a school-based program, viz., 'Bike Ed'.

Wells, Downing & Bennett (1979) found that 8 year olds did <u>not</u> benefit from on-road or off-road training schemes to the same extent as nine or ten year olds. They concluded also that age had a greater influence on performance than experience.

In addition to the question as to what age should training commence, the question arises as to on-road training versus off-road training. Wells, et.al. (1979) in a comparison of on-road versus off-road training of three age groups (8 year olds, 9 year olds and 10 year olds) found:

- either training resulted in a large reduction of errors;
- the significant improvement was still evident 6-8 months later although diminished somewhat;
- on-road training produced better performance than off-road training both immediately after and 6-8 months later, although over time the difference between the two groups declined;
- off-road training produced more errors than on-road training, especially errors related to looking for traffic.

As mentioned above, the literature on bicycle education is rather scant and especially in relation to evaluation of educational programs. Bicycle education in Australia received its greatest impetus initially from the Geelong Bike Plan (1977) which involved education as one of its four integrated strands. 'Bike Ed' (Newlands, 1979, 1980) grew out of this Plan. The Newcastle Area Bike plan recommended the trial of 'Bike Ed' in Newcastle.

'Bike Ed' was subsequently trialed and evaluated in Newcastle. 'Bike Ed' involves the training of children aged 9-13 involving both on-road and off-road experiences. According to Newlands (1980). 'Bike-Ed' aims to teach safe bike riding techniques by teaching road law and habits of care and alertness; by instilling in the rider that he or she is a part of the total road traffic network and therefore must be capable of making responsible decisions in any situation.

Trials were undertaken in Newcastle and evaluation using three groups of year 5 (10 years of age) cyclists - no training - off-road training and on-road training. Trotter & Kearns (1983) were somewhat guarded in their conclusions from their evaluation of the Newcastle trial.

> "Overall, it appears that the 'Bike-Ed' course, including the on-road training segments, would be more effective in improving children's safety related behaviour than a course limited to merely off-road on-cycle training." (Trotter & Kearns 1983, p.46).

Trotter & Kearns, nevertheless, strongly supported the use of off-road training rather than no training at all. They also warned that any form of training could result in increased exposure to traffic.

In a follow-up study, one year later, Kearns & Rothman (1983) found similar results to Wells et.al. (1979); i.e. that deterioration occurs but that the follow up level of performance was still well above the pre-test (pre-exposure) stage. However, Kearns & Rothman (1983) did not find that on-road plus off-road produced more lasting effects than off-road only training.

Shanks (1983) carried out a cost benefit analysis for the implementation of 'Bike Ed' in Geelong schools (approximately 70% of schools). According to Shanks:

> "Bike-Ed in Geelong 1980-1982 was cost effective with a ratio of benefits to costs of over 4:1" (Shanks, 1983, p.9).

Bike Ed is the result of considerable effort in development and evaluation. It must not, however, be regarded as beyond improvement. Whilst it may be the "best" available, it is quite likely that the "best" is far from good enough. The Victorian Road Traffic Authority has been reviewing the program, including its implementation, in recent years (See Richards 1982, Strong & Renkin 1983, and Gardner 1984). It is clear from these (at this stage confidential) studies that Bike-Ed can be improved both in content and implementation. It must be noted that alternatives to Bike Ed do exist. For example, in South Australia a curriculum unit for upper primary school exists. This unit entitled "Ride For Your Life" was developed in 1980 by the Educational Technology Centre of the S.A. Department of Education. To date no evaluation has been carried out.

The emphasis on 'Bike Ed' has been deliberate. This should not, however, exclude consideration of design factors. As with changes in the design of motor vehicles (i.e. lower the height of the bumper bar) changes in the design of cycles can improve the safety of the cyclists. A number of studies (Rice & Roland, 1970; Lewis, 1973; and Mortimer, Domas and Dewar, 1973; all cited in Chlapeck, 1975) have indicated a relationship between the style of cycle and its relationship to handling performance, depending on the age of the child and speed travelled.

Problems such as handle bar design, seat design and constructions for various age and developmental levels need to be examined. Also, the need for the correct size of cycle and road worthiness of cycles need to be stressed as well as the danger in doubling, even with adult cyclists.

8.432 Recommendation - Facilitate The Adoption of Bike-Ed

1. In view of the findings that children 8-16 (especially boys) are a major problem with respect to bicycle accidents and that on-road/off road training has been demonstrated to be effective and even cost effective, it is recommended that 'Bike Ed' be more widely adopted throughout Australia.

Implementation of 'Bike Ed' requires a supply creation, i.e. on awareness and interest in headmasters and teachers and a training of teachers. It also requires a development of demand from parents and children.

'Bike-Ed' is being used beyond Geelong and Victoria. However, even in Victoria there is a need to increase penetration. Shanks (1983) after allowing for small schools (one or two teachers) claimed that only 40% of metropolitan schools and 49% of country schools are participating in the 'Bike Ed' program.

2. The problem of supply will require a number of measures. The least expensive is to introduce 'Bike Ed' as part of the curriculum of all trainee teachers so that each year all new primary school teachers are trained in 'Bike Ed'. Shanks makes many other suggestions which tend to reflect the organisational aspects in Victorian schools.

3. As a suggestion, given the size of the problem and the male orientation, male orientated service groups (e.g. Apex,Lions, Rotary,Scouts) could be approached to have suitable fathers trained. There is no reason why 'Bike-Ed' courses could not be provided of a weekend by service groups. Further, school holidays provide another opportunity for 'Bike Ed'. Perhaps teachers could be paid to run 'Bike Ed' courses in school holidays when children are often at a loss as to how to amuse themselves.

4. Whilst overcoming supply problems are critical to the successful implementation of 'Bike-Ed', there is also a need to stimulate community awareness and demand for Bike-Ed courses for their children. There is a need to consider low-cost means of stimulating awareness and interest (demand) amongst the following segments:

   Headmasters
   Teachers
   Police
   Service groups
   Youth groups
   Parents
   Parents and Citizen Groups.

It is quite likely that if Parents and Citizen (Parents and Friends, etc.) groups have a strong desire for 'Bike Ed' in a school it will happen. The task of stimulating such a demand is not a difficult one.

5. If, as Gardner (1984) maintains, financial obstacles appear to be preventing many schools from implementing the 'Bike-Ed' program, then involvement of community groups and/or commercial sponsors should be approached for financial assistance rather than leaving it to competing government sources as per the Gardner (1984) recommendation 7 ("....discuss the possibility of organizing a short conference involving transport, education and perhaps treasury officials....)"

8.433 Helmet Usage

In recent years there has been an ever increasing call for the use for safety helmets by pedal cyclists. Very little information has been published on the effect of safety helmets on child pedal cyclists. In Australia, there is good reason for the lack of data. The incidence of child pedal cyclists wearing safety helmets is less than 5% of all child pedal cyclists (Torpey, 1984).

The HORSCORS (1978) Report recommended:

> "289. Cyclists be advised of the safety benefits of protective helmets by publicity or other suitable means - the possibility of requiring cyclists to wear helmets be kept under review". (HORSCORS, 1978).

The HORSCORS report concluded that the most significant form of cyclist protection in the event of an accident is for cyclists to wear protective clothing, especially crash helmets. The report also pointed out that the majority of serious injuries to cyclists occur to the head, and head injuries are a major cause of death.

Dr. Frank McDermott, Victorian Chairman of the Road Trauma Committee of the Royal Australasian College of Surgeons, has for a number of years (McDermott 1982 & 1984) advocated the need for bicycle helmet usage because most bicycle related deaths are due to head injuries. There is a sizeable number of people advocating compulsory wearing of helmets in Australia. Arnberg (1979) recommended that children be forbidden to cycle to school unless they use adequate protective equipment.

The importance of wearing safety helmets has most recently been emphasised by McDermott (1984) and by Dorsch & Woodward & Somers (1984). The value and importance of pedal cyclists wearing safety helmets appears beyond question at this point in time. (see Section 2.6 of this report for more detailed corroborative evidence and also Trinca 1983 and 1984).

The essential problem is one of implementation. The lack of usage of safety helmets by children is most evident. At most, 5% of children 9-16 wore them, until recently in Victoria where wearing rates have risen to up to 15% in some geographic areas whilst remaining at almost zero levels in other regions (Torpey 1984).

The reasons for lack of usage of helmets by children in Melbourne was first suggested by B.J. Elliott & Associates:

> "The basic problem is that of being different. Most children really do want to conform to peer group values. To quote my earlier report:
>
> 'Helmets are a definite put down. Whilst adults might wear them, boys feel very strongly that to wear a helmet is the surest way to be made a fool of, and even be ostracized "like being the teachers pet" - "a real suck!". (Elliott & Assoc., 1982).

Given the resistance of children 10 years of age and over, especially amongst boys, B.J. Elliott & Associates (1983) recommended that the direct target for any campaign should not be this age group but instead mothers, school teachers, and younger-age children.

Early in 1984 the Victorian Road Traffic Authority developed a comprehensive program designed to increase the incidence of wearing of helmets amongst child pedal cyclists. The program included two television commercials which were subject to qualitative diagnostic pre-testing by B.J. Elliott & Associates (1984). The campaign adopted the earlier recommendations of B.J. Elliott & Associates and was aimed at Mothers and younger children. The report re-iterated that attitude change would most likely occur after behaviour change; i.e. after parents insisted on compulsory use.

The results of the 1984 campaign (which involved a coordinated program including mass media advertising) suggest that wearing rates have trebled from 5% to 15% (Torpey 1984) in some areas of Melbourne. However, there is a definite socio-economic bias in the effects in favour of upper-middle class compliance.

As implied above, the basic communication task is that of generating a sufficient level of compliance such that wearing a helmet is seen as the 'norm', not the exception. The efforts of the Road Traffic Authority are to be applauded and every effort is needed to ensure continued compliance over time and increases in compliance. There is a real need to get compliance levels up to around 30% at which time mandatory compliance will become a possible option. The contagion or snowballing effect will only take off slowly in the beginning.

8.434 Recommendations - Helmet Adoption

1. The Victorian Road Traffic Authority helmet campaign be monitored to ensure adoption rates are sustained.

2. That the campaign (as a totality) be implemented in other States with appropriate modifications.

3. That special efforts be made to encourage parents to act via parents groups to ban the riding of bicycles to and from school unless approved helmets are worn.

   With respect to the latter the likely result in the short run will be a decreased exposure of children on bicycles since many will opt not to ride their bicycles rather than be seen wearing a helmet.

4. The Standards Association Design rules should be modified especially with regard to colour and appearance so that children can customise their helmets. The insistence of white or yellow is counter-productive.

8.44 Graduated Licensing - Restriction of Passengers

The concept of graduated licensing is supported by the Commonwealth Department of Transport according to a press release dated 4/6/84 from the Minister for Transport Australia. Such a concept has a number of ingredients most of which are likely to remain controversial for some time. In a section on countermeasures aimed at influencing road accidents involving children its inclusion may seem somewhat obtuse.

At the outset, it must be noted that there is overwhelming evidence that decreasing the incidence of accidents involving young drivers (17-20) and/or novice drivers (first 2-3 years) would have a dramatic effect on the child road accident situation and an even greater impact on the total road accident situation.

Additionally, what is being proposed in this section of the report is approval of a 'principle' which, if put into effect, is likely to result in a massive reduction of children (teenagers) injured or killed in road accidents. The basic premise is that at least one aspect of graduated licensing has considerable merit. This does not imply an agreement with all aspects of graduated licensing as proposed by the Federal Office of Road Safety.

The most controversial aspect of graduated licensing is likely to be the age of commencement. Whilst such an issue is critical to the implementation of graduated licensing it is a separate issue from the principle as to what age a license ought to be granted.

Currently, de facto graduated licensing exists in some states. For example, Tasmania has had a zero BAC law for first-year drivers for some years. Most recently, Victoria also adopted a zero BAC for first-year drivers. N.S.W. is currently considering such a law. S.A. and W.A. have lower limits for first-year drivers than for experienced drivers.

Another issue revolves around driver training. The call for better driving training is perennial. To date, there is a considerable body of evidence built up over almost 20 years that driver training programs have little positive effect on driver behaviour. A basic premise behind graduated licensing is that the best training is actual experience tempered by practical restrictions inhibiting those factors known to increase the probability of an accident (such as alcohol, night driving, presence of teenage passengers, etc.).

As far as accidents involving children 0-16 are concerned the reason for recommending the graduated licensing countermeasure is primarily the desire to keep child and teenage occupants out of cars driven by first and perhaps second year drivers. Thus graduated licensing is recommended on the grounds that "peers" should not be allowed to be present in the vehicle, at least not without adult supervision, and at least not in the first year.

Whilst the greatest likely impact on road accidents involving children 0-16 is as passengers, there is also evidence that novice drivers in their early years are also more likely to be involved in child pedestrian and child pedal cycle accidents than their more experienced counterparts. The evidence comes from this review and from overseas studies. Sandels (1974) reported that 18-22 year old drivers were over-represented in accidents with young children 0-10 years.

This Swedish finding has been confirmed more recently by SWOV (1977). Brown (1980), in reviewing driver behaviour factors involved in pedestrian accidents concluded that he and other reviewers have identified that younger novice drivers are over involved in child pedestrian accidents.

Teenage passengers killed in Australia in 1981 were quite likely to be passengers in cars driven by young drivers. Of the 15-16 year olds killed as passengers in vehicles driven by males, over 50% involved a driver aged 16-18 years of age.

TABLE 91 TEENAGE PASSENGER DEATHS IN AUSTRALIA 1981

	Male Driver Age of Deceased			Female Driver Age of Deceased		
Age of Driver	13-14	15-16	17-18	13-14	15-17	17-18
16-17 years	15	48	48	3	7	11
18 years	4	29	72	-	4	9
19 years	2	11	57	-	2	5
20 years	3	10	28	-	1	3
21-25 years	8	11	57	-	5	8
Over 25 years	31	31	30	22	28	4
Total	63	140	292	25	47	40

Source: DOT Fatal File 1981

Karpf and Williams (1982) reported that there was almost equal numbers of teenage passenger (16-19) deaths as driver deaths. Williams and Karpf (1983) found that for 13 year old passenger deaths half were passengers of teenage drivers. Sixty three percent of deaths of passengers 13-19 years old resulted from travel with teenage drivers. Those drivers were predominantly males, especially in the case of fatally injured male passengers. Male drivers 16 and 17 years old had the highest proportion of teenagers (86% and 84%, respectively) among their passengers who sustained fatal injuries.

The majority of fatally injured teenage passengers sustained their injuries in vehicles driven by teenage drivers and most of the passengers fatally injured in vehicles driven by teenage drivers were teenagers. Deaths of teenage passengers 13-19 year olds tended to occur in crashes taking place at night after 9 p.m. especially weekend nights.

Teenage passenger death rates in the U.S. begin increasing at age 13 according to Williams and Karpf. Their findings reflect different types of exposure as passengers reflecting greater tendencies of teenagers (with higher death rates) to travel with teenage drivers, especially males who have extremely high crash rates per licensed driver.

Teenage passengers of teenage drivers reflect two sub-populations of teen passengers - peers and siblings. Karpf & Williams (1982) had earlier suggested the way to reduce the teenage road death problem is to raise the minimum license age, eliminate high school driver education (which increases the incidence of 16-17 year old drivers but not the incidences of crashes) and prohibiting 16 and 17 year olds from driving late at night or early in the morning.

As a result of further analysis, Williams & Karpf, (1983) found that three quarters of the passengers fatally injured in vehicles driven by teenage drivers were teenagers. Additional evidence of the need to eliminate teenage passengers from vehicles driven by teenage drivers comes from a number of other sources. Ruch, et.al. (1970) found that college students admit to the presence of others as a cause of distraction and a precipitating cause of accidents - data which is normally not admitted to the investigating Police officer. Foldvary & Lane (1969) found that the presence of teenagers, especially in large numbers, is associated with increased crash risk for teenage drivers.

Clearly, the high incidence of teenage (13-16) deaths and injuries as car passengers ought to be of concern to all. Vehicle passengers account for over 50% of all children 0-16 involved in road accidents and almost 50% of fatalities in this age group. Teenagers 13-16 account for around 40% of all injuries or fatals involving children 0-16. The 13-16 age groups accounts for only 23% of the total population age 0-16 years.

Further evidence of the importance of young novice drivers derives from the present study (see section 4.134-5; & 4.328).

In the accident figures supplied in section 2.4, drivers aged 0-16 were excluded since the great majority of these drivers are driving illegally and the number is relatively small. Nonetheless, the numbers as presented in table 92 ought to be of grave concern especially to N.S.W. road safety authorities.

TABLE 92 UNDER-AGE DRIVERS (CARS, MOTOR CYCLES, OTHER)

	1981		1982	
	Fatals	Injured	Fatal	Injured
N.S.W. 1.	10	216	10	252
Vic.*	5*	52**	1	76
Q'ld.**	10	49+	3	5

Sources: TARU (N.S.W.), RTA (Vic.), DOT (Q'ld.)

1. All aged 8-16 (less than 10% females)

* 1 aged 8-12

** 5 aged 8-12

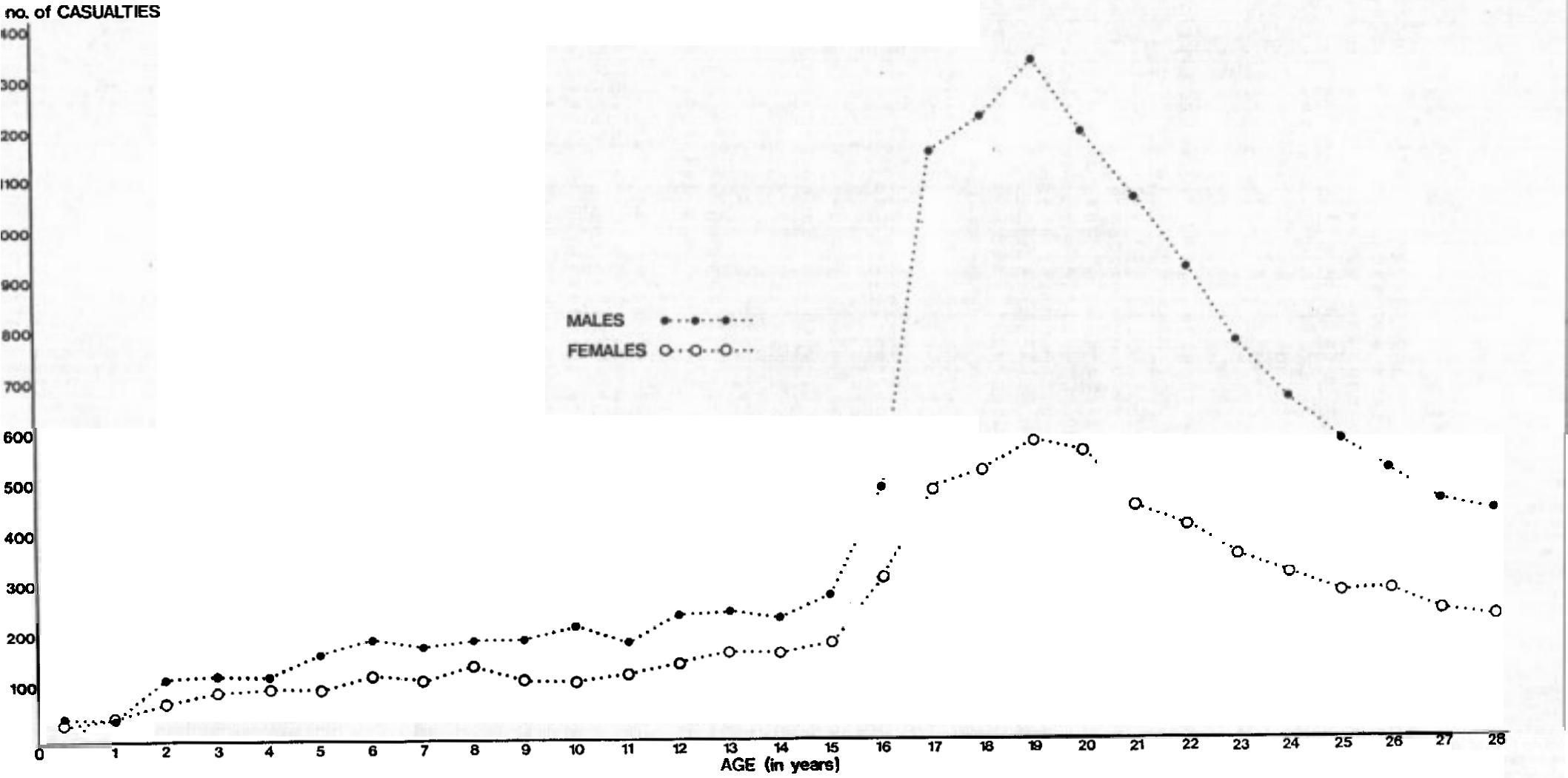
\+ 2 aged 8-12.

FIGURE G

ROAD ACCIDENT CASUALTIES BY AGE 0-28 YRS

NSW 1983

(source: TARU year ended Dec 31 1983)



Another set of figures is very instructive regarding the teenage accident problem. Indeed, it reveals that the analysis carried out on children 0-16 tends to hide the magnitude of the problem of teenage road accidents in today's Australian society. Figure G plots the number of males and females involved as casualties (killed or injured) in road accidents in N.S.W. for 1983 by each age year from under 1 year to 28 years of age. The chart speaks for itself. Clearly, the biggest problem begins at age 15, climbs dramatically at 16 and especially 17 and peaks at 19. If the same data were plotted on logarithmic paper to show rate of change the chart would be even more dramatic.

According to the RACS "Road Trauma" (1982) booklet the age group 17-20 years represented 7.1% of the total Australian population in 1980 but accounted for 22.6% of passenger deaths; 24% of passenger injuries; 40.3% of motorcycle and pillion passenger deaths; 37.5% of motorcycle and pillion passenger injuries. Such a small proportion of the population are so vulnerable and dramatically effect the total road accident situation.

The DOT fatal file reinforces the role of young people in the total road toll.

TABLE 93 PERSONS KILLED ON AUSTRALIAN ROADS 1981

Age	Pedest-rian	Drivers Vehicle Pass.	Drivers Cars	Motor Cycle	M.C. P.P.	Pedal Cycle	Total
0-4	36	42	-	-	-	2	87
5-16	92	107	12	16	5	63	318
17-20	29	200	255	104	14	11	642
21-25	30	118	241	134	16	9	563
26-29	16	36	126	38	3	3	226
30-39	43	56	221	36	2	6	374
40-49	48	47	142	11	-	5	257
50-59	70	67	124	5	-	3	273
Over 60	239	108	143	2	-	7	507
Unknown	4	8	5	-	-	-	19
	607	789	1269	346	40	109	3266

Source: DOT Fatal File 1981

1. Excluding motorcycle drivers.
2. Includes unknown road user type & bus passengers and other.

The age at which most young people gain a provisional license is age 17 in N.S.W. and, to a much lesser degree age 18. By age 19 two thirds of the drivers who will hold a provisional drivers license in any one year already have done so.

TABLE 94 NUMBER OF PROVISIONAL LICENSE HOLDERS IN N.S.W. 1981-82

	Drivers			
	1981		1982	
Age in Years	Male	Female	Male	Female
16 years	69	15	96	23
17 years	22,494	13,875	22,312	14,001
18 years	10,629	8,455	11,190	9,106
19 years	4,680	4,686	4,913	4,966
16-19	37,874	27,031	38,511	28,096
20-24	9,199	9,959	9,263	10,787
25-29	3,665	4,485	3,541	4,936
29 & over	6,269	7,355	5,613	8,127
All ages	57,007	48,830	56,928	51,946
	Riders			
16 years	15	-	14	-
17 years	2,502	156	1,842	101
18 years	927	107	852	75
19 years	446	49	426	47
16-19	3,890	312	3,134	223
20-24	1,262	443	1,127	91
25-29	539	25	453	23
29 & over	431	57	318	61
All Ages	6,122	837	5,032	398

Source: TARU (N.S.W.)

8.441 Recommendation

1. Graduated licensing ought to be carefully considered, especially those aspects which would exclude the presence of child and teenage passengers in cars driven by novice (first or second year drivers).

2. Additionally, the proposed restriction of novice drivers to daylight hours could also have a sizeable effect on teenage passenger acccidents.

3. The elimination of passengers, except adults, could also assist in a reduction in the number of pedestrian and pedal cycle accidents amongst children 0-16.

4. Finally, the elimination of child passengers, where no adult is present when teenage novice drivers are at the wheel, could have a sizeable impact on the number of young people 17-20 killed or injured as passengers or drivers. This group alone accounted for 432 deaths in 1980, which was in excess of the total number of children 0-16 killed (415) in 1980 on the roads (all user categories). (RACS "Road Trauma" 1982).

8.5 Other Suggested Countermeasures

8.51 Changing the Status and/or the Character of Residential Streets

Howarth & Gunn (1982) propose a novel approach to the child pedestrian accident problem involving engineering, education and legal measures. Their proposal, first considered by Howarth & Repetto-Wright (1978), involves giving similar legal status to the total area of all roads in residential roads as exists for pedestrian crossings. This status would apply to all children below a given age: they suggest 9 or 11 since 9 is the age children in the U.K. are no longer allowed to ride bicycles on the pavement whereas at age 11 the child has almost mastered adult road crossing skills and they travel further to secondary school.

Howarth & Gunn (1982) argue that their proposal ought to be considered because of the failure, to date, of education and engineering measures to protect child pedestrians.

The problem of child pedestrian accidents can be clearly defined (as far as Australia is concerned):

- metropolitan
- minor local roads
- near home
- 4-12 years of age
- especially males
- widely dispersed accident sites.

The importance of residential streets in child pedestrian and pedal cycle accidents is covered in detail in other sections of the report including section 3.2. Recent evidence is also available in Brindle & Andreassend (1984) and Andreassend, et.al. (1984).

To overcome these problems, engineering solutions are often seen to be prohibitively expensive although the countermeasure proposed in 8.42 above could make considerable inroads into the problem. It must be noted that, in the case of residential streets, engineering solutions are not necessarily "prohibitively expensive" because (usually) improvements in residential amenities - attractiveness, quietness, etc. - are concurrently achieved, and local communities are often prepared to pay for these.

In neighbourhoods with young children, people will often be prepared to pay for changes simply for the sake of greater safety.

In terms of educational solutions an entirely different set of problems exist. The major problem, at least with respect to primary school-aged children (the main problem group) revolves around how children cross roads. Studies by Routledge, et.al. (1976a) show that road crossing strategies change dramatically between the ages of 5 and 10 years. The problem is that children learn two conflicting strategies. On the one hand they have formal training in child strategies for crossing the road. This is desirable. However, they learn informally adult crossing strategies from older siblings and parents. At age 5 children adopt the formalised child orientated strategies. By age 10 most have adopted adult strategies (Routledge, et.al. 1976a).

In a nutshell, at age 5 they stop at the kerb, look both ways and cross only if the road is clear, behaving as taught. By 10 years of age they are likely to assess the traffic situation prior to reaching the curb and step out onto the road without pausing. They don't wait for the road to clear and they negotiate quite small gaps in traffic. Like adults they are likely to cross immediately after a car has passed.

Howarth & Gunn (1982) would argue that the two strategies the child is learning are conflicting. Furthermore, we cannot stop the child learning the adult strategy and that such a strategy is essential for crossing busy roads. Nor can we change adults. The child crossing strategies are, on the other hand appropriate for quiet roads where many (most) accidents occur and where the child can adopt the wrong strategy. It is possible to argue that the teaching of one strategy interferes with the teaching of the other. This puts a theoretical limit on education as a successful countermeasure.

The success of education programs aimed at this problem is at best equivocal. Grayson & Howarth (1982) in a review of the evaluation of pedestrian safety programs point out that because of the lack of relevant and regular exposure data there is no single large scale pedestrian safety program about which one can be certain that it has had an overall effect on safety in the sense in which the term is usually understood. The often quoted U.K. Green Cross Code program did result in a reduction in the total number of accidents but there is no certainty as to whether it reduced exposure or risk or effected children rather than adults.

In support of the views of Howarth & Gunn (1982) there is no documented educational program which has ever produced a reduction in accidents of more than 10%. Accordingly, it can be argued that education is not likely to bring about a major reduction in child pedestrian accidents.

The pessimism of Howarth & Gunn (1982) is quite widespread throughout the child pedestrian road safety literature and it must be conceded that the seeming failure of engineering and educational methods to date cannot be dismissed lightly. At the same time it must also be conceded that where they have been effectively implemented, engineering measures have been very successful.

Changing the legal status of all roads in residential areas as far as children are concerned (age to be defined) would of course require engineering and education supports. With regard to engineering measures it would be necessary to distinguish the roads on which child pedestrians have priority from those major roads on which children can't have priority. Such engineering measures may involve a paint and a brush!

An essential part of such a scheme would be the need to face the problem of the parked car since the evidence is clear that parked cars increase the danger to child pedestrians. Thus painted markings would be needed to restrict parking. According to Howarth & Gunn the lines (yellow):

> "....would indicate a road on which cars had priority, at least to the extent that the present law gives it to them. Children could be told to regard them as a barrier, and that they should never, under any circumstances, attempt to cross them without help." (Howarth & Gunn 1982, p.269).

Clearly additional engineering facilities would be needed such as warning signs to differentiate between major roads and minor residential roads.

Finally, the implementation of such a legal status change would require a media campaign and an educational campaign to teach the new rules to adults, drivers and children and to persuade all of them to obey the new rules.

This countermeasure has been included because the writer believes that a range of solutions is needed. Current practices, as far as they have been adopted (many only partially or imperfectly), appeared not to have achieved as much as would be hoped for. This could reflect, not on the status of the current practices but, on the insufficiently wide application.

The basic premise inherent in the legal status change is in accord with the OECD (1983) belief that the loss of life to young children on the roads is a grave human and moral problem. As such, it is not of the child's making but of the adult and, in particular, the adult motorist. It is the motorist who may need to give up some freedoms for the sake of the child. This same argument applies to another suggested countermeasure involving speed reduction in neighbourhood areas.

In section 3.3 it was argued that the attribution of fault in child pedestrian accidents is mostly on the child and not the driver. The motorist's defense is invariably "the child ran out on to the road and there was nothing I could do to prevent the accident." As the law stands and is administered this type of defense usually leads to either no prosecution or an acquittal.

Howarth, et.al. (1974) calculated the probability of an accident per potential encounter with a car. For five year old boys it was 1:10,000 and for 10 year olds it was 1:100,000. This means that all but one in 10,000 or 100,000 of potential accidents are avoided. But who is doing the avoiding? Howarth & Lightburn's (1980) observational study unequivocally revealed that whilst a great deal of avoiding action is exhibited by children no driver was ever seen to take avoiding action until it was too late.

The Howarth & Lightburn study revealed that child pedestrians, especially younger children, do stop and wait and take long-range action. Motorists, in contrast exhibit no long-range anticipation such as slowing down or moving to the centre of the road when they see children.

Howarth & Gunn argue that the evidence overwhelmingly suggests that:

> "most child pedestrian accidents occur between a child who is uncharacteristically and exceptionally heedless, and a driver who is routinely so." (Howarth & Gunn, 1982, p.273-4).

This viewpoint has been made often before from Sandels onward. Motorists ought to be made to take responsibility for child pedestrian accidents. The following quotation should not be dismissed too lightly:

> "It is clear that a defense based on the heedlessness of the child and the inability of the driver to avoid the accident, is probably spurious. It may be helped by the feeling of juries, and indeed all adult drivers that 'there, but for the Grace of God, go I'. One is tempted to argue that we are all aware unconsciously, of our collective potential guilt, aware that as a community of drivers we are collectively responsible for these accidents." (Howarth & Gunn, 1982, p.279).

Clearly, there is no intent by drivers to intentionally harm children. But this could well be another aspect of drivers' collective incompetence. Talking to drivers it becomes clear that they would deny that they are driving unsafely with respect to children. Drivers simply don't know; i.e., they are not aware that they themselves are the potential problem. The great attraction of the 'changing status of residential streets' countermeasure is that it shifts the responsibility on to the motorist because now the child on the road has the same status as the child on a pedestrian crossing.

8.52 Town Planning and Engineering - Lowering Speeds in Residential Streets

Rarely is the traffic environment designed with a full understanding of children's behaviours, wants and needs. Planners place roads and parking areas within courtyard areas of multi-story residential areas, exits from houses and complexes slope away from the house towards the road with no protection for a cyclists, hedges and bushes block views for small children not adults. Schools and child-care centres are located on busy roads often without adequate fencing, surrounded by parked cars and buildings or play areas segregated by roads. Downhill slopes of roads with lights or intersections induce cyclists to speed and 'beat' the lights. As well there are obstructed views at bus stops and crossings situated in depressions.

Other potentially dangerous areas include shops, ice-cream vans, news stands, or mail boxes - anywhere where the child may become excited at the prospect of doing or obtaining something. Truck and trailers are hard to stop and are fascinating to children and, as with shops, they become involved in the object of their attention and ignore the rest.

The question is what can be done to improve the physical environment to make it safer for our children while still allowing them to fulfill their natural urges and experience their environment. Many countries around the world have implemented programs of environmental design changes with considerable success.

Berard-Andersen (1982) reported on some programs commenced in the early 1970's. France initiated plans for street reorganisations and accident rates to child pedestrians in densely populated areas fell by 40% between 1971 and 1976. The Japanese introduced the Traffic Safety Countermeasures Fundamental Law which lay the responsibility for traffic accidents with the local authorities. Various methods of street and traffic design were implemented across the country and since their introduction there has been a steady and sharp reduction in accidents. Finland used a reduction in the speed limit and successfully reduced the fatalities for under five year olds by two thirds between 1972 and 1978.

The OECD (1983) report stressed that planners must be aware of the different requirements of various areas. Residential areas upon which more young and elderly pedestrians are injured and killed need a different form of road access and their layout should provide safety and assistance without impeding the flow of traffic. Such a concept is 'woonerven', a Dutch design where traffic, cyclists and pedestrians are not segregated but the pedestrians and cyclists have the dominant role and roads are designed to reduce the hazard of motor vehicles by narrowing streets, shortening their length and providing obstacles such as humps or roundabouts.

Existing areas can be modified by direction of traffic through one-way street and blocking off streets. Reducing speed by humps, etc., and providing off street parking. These modifications appear to have been successful wherever they have been implemented.

In 1979, the OECD reporting on Traffic Safety in Residential Areas (cited in OECD, 1983) recommended that:

> "strict differentiation of streets according to their traffic function leads to safe residential areas; - distribution into a residential area with multiple access from a ring road is safer than central distribution; - full separation of vehicle, pedestrian and cycle movement is accompanied by very low accident rates; - cul-de-sac streets are safer than loop streets and considerably safer than ordinary through streets; - on those roads providing a distributive function, accident rates are minimized where frontage access is prohibited and the layout of the

> residential development is such that pedestrian and cyclists have no need to use routes that run alongside highways; - space sharing techniques like 'woonerven' that encourage pedestrians to make use of the full highway width, making drivers more aware of their responsibilities towards the more vulnerable groups." (OECD 1983, p.62).

Barson (1977) pointed out that, in Australia, residential streets account for approximately 77% of total street mileage in capital cities. They carry 25% of vehicle miles travelled and 42% of all traffic accidents. These streets would appear to be prime targets for the adoption of physical countermeasures. According to Quayle (1978):

> "the most effective laws to enhance pedestrian safety are the urban area speed limits, which could well be lowered to 40 km/hr in residential streets, and parking restrictions to prevent pedestrians, especially children, from being obstructed by vehicles at hazardous locations";
>
> ".... with the increasing use of left turn slip lanes, and the greater speed at which vehicles can turn left the desirability of giving pedestrians precedence over left turning traffic is questionable. Allowing traffic to filter to the left past the red light with care would be preferable." (Quayle 1978, p.10-11.)

Arnberg (1979) studied the hazardous locations around schools and concluded the best method to reduce the speed of vehicles was with speed humps. He also recommended that all children having a dangerous route to travel upon to school be transported, this would be regardless of distance needed to be travelled.

Other protective measures for school children include the increased use of crossing guards, laws prohibiting the overtaking of stationary school buses and special signs to distinguish school buses from other buses and the increased use of various conspicuity aids for children.

The Transport Tasmania Study (1983) recommended the higher use of flags to indicate school zones and the use of traffic lights where high volumes of children need to cross the road. Median refuges were also recommended so as to allow sufficient time to cross the road and the child would only need to worry about the flow of traffic in one direction. However, there seems no research available to indicate whether or not young children can handle such refuges. Wade, Foot & Chapman (1982) suggest a greater use of pedestrian bridges and tunnels, provided they were correctly designed and located. Another device is the use of fencing to channel pedestrian traffic to specific crossing facilities.

It is difficult to propose specific engineering and town planning activities. The above review is included as a background for the need for and possible effects of a better traffic environment designed with the child in mind. Whilst the ultimate aim is to design environments which segregate very young children from traffic, such an ideal is rarely achievable, especially in existing neighbourhoods. But what is achievable is a reduction in vehicle speeds.

There is considerable evidence to suggest that a very sizeable number of children injured or killed in road accidents are involved in accidents near home or school and basically on neighbourhood streets. This point has been developed in detail in sections 2.5; 3.2; and 4.318. Not only is the child pedestrian problem a metropolitan problem it is also largely a local or neighbourhood street problem. Clearly, it is impractical to provide many more pedestrians crossings, especially since accidents tend to occur at widely dispersed sites with low levels of pedestrian, bicycle or motor vehicle traffic.

For many reviewers of the child road accident problem (at least as far as pedestrians are concerned) there is a belief that the level of child pedestrian accidents is likely to continue at existing levels because of the nature of the child and the seeming lack of efficacy of educational efforts to date. The solutions most frequently nominated in the past were of a town planning orientation designed to segregate young children from traffic.

Segregation is impractical in most existing neighbourhoods. However, efforts to reduce the speed of motor vehicles on neighbourhood streets is not so impractical. Little empirical evidence on traffic speeds appears to be available. The data from the Jamieson, et.al. (1981) exposure study is currently being analysed in an effort to determine actual traffic speeds in residential or local streets. Brindle (1982) urged more needs to be known about accident rates, vehicle speeds and road characteristics.

It seems reasonable, based on the accepted scientific laws of motion, to hypothesise that slowing vehicular traffic in residential streets will reduce both the incidence and severity of impacts or encounters of pedestrians and motor vehicles and pedal cycles and motor vehicles. Brindle (1982) put forward a similar view. More recently Brindle & Andreassend (1984) in analysing bicycle accidents in Melbourne (Vic.) argued that:

> ".... accidents involving young cyclists occur frequently on local streets and collectors where they and their parents would justifiably expect a greater sense of security. An environment which is more protective of young cyclists in local streets appears to be predicated." (Brindle & Andreassend 1984, p.108).

A variety of means exist for slowing down traffic. The evidence suggests that physical measures are far more effective than voluntary or mandatory speed regulations (OECD 1978; Brindle 1982). Recent experiments in Victoria (Geelong and Coburg) demonstrated how difficult it is to decrease vehicle speeds in residential streets by changing speed regulations (see Brindle 1984 point 46).

Stapleton (1983 and 1984) argues that a vehicle travelling at 70 km/h on a typical Australian street and travelling in a straight line, reasonably well to the middle of the carriageway, cannot avoid a child running out from a driveway unless the driver has a reaction time of less than 0.7 seconds. Stapleton (1983) argues that to achieve acceptable safety visibility standards many features of existing streets cannot be improved to these visibility standards without a reduction in vehicle operating speeds. He claims that vehicle operating speed has a strong influence on his hazard analysis and thus any low cost measures to reduce speed would show considerable benefits. According to his analysis:

> "the cheapest solution is not that currently being considered in traffic management studies." (Stapleton 1983, p.50).

8.521 Recommendations - Lower Vehicle Speeds in Residential Areas

1. neighbourhood streets play a prominent role in child road accidents. Re-design of neighbourhood streets is desirable. Within the existing framework a number of activities can be undertaken.

2. Reducing the speed of vehicular traffic in residential streets is likely to have a major effect on all categories of child road user accidents by lowering both the incidence and severity of those accidents.

3. Speed reduction is best achieved by physical/engineering means and not by voluntary or compulsory compliance of lowered speed regulations. The precise nature of the physical means required ought to be left to the engineers. Whilst the writer may favour speed humps the engineers may not.

4. The implementation of physical devices to slow down traffic can have a direct consequence on driver behaviour resulting in slower vehicle speeds. At the same time, there could well be a concomitant outcome. Drivers, when forced to slow down, may begin to ask "why". They may even get annoyed. If the act of slowing down and the presence of children occurs it is conceivable that drivers will become more aware of children in neighbourhood streets and the need to slow down and be more cautious.

5. The construction of physical devices of necessity will also involve councils and make them more aware of the child road accident problem.

8.53 Other Suggested Education Countermeasures

Some Education countermeasures have already been recommended in sub-section 9.31 (teenage restraint use) and 9.33 ('Bike-Ed'). In this section, other possible programs are suggested for:

- Pre-School
- Primary School
- High School

8.531 Pre-School

In recent years there has been a number of attempts to commence road safety traffic education before children commence school. As indicated in section 8 of this report, Children's Traffic Clubs have been instituted in a number of countries including Sweden, Finland, Germany, Holland, England and Japan. In the Scandinavian Countries the clubs involve children from age 3 to 6 1/2 years. In some countries children do not commence formal schooling until 6 1/2 - 7 years. The essence of the Children's Traffic Clubs is the involvement of parents in the process and teaching the child safe behaviours in a real traffic environment taking into account the developmental limits of the child.

In chapter 8 a number of pre-school education countermeasures were briefly reviewed in an effort to determine if such measures are likely to result in an increase in safe behaviours for young children. In suggesting any countermeasures in this area a number of questions need to be answered:

Have pre-school programs achieved anything to date?
At what age should children begin to be taught?
Can parents be adequate teachers?
What should the content be? etc.

To answer these questions adequately would require a separate volume. In the paragraphs which follow a number of "hypotheses" will be put forward based upon the reading of the author in his analysis of the material available in the published literature.

Stand alone printed material sent to mothers is unlikely to be effective; i.e., mothers are unable to read material and train their children effectively. Embry (1984) carried out a study with pre-schoolers who did not go to a kindergarten. The mothers were given printed material and the children's behaviour observed. Where the program operated, Embry observed a 50% reduction in street-entering behaviour. Nonetheless, he concluded, "that giving parents stand alone material is not nearly as effective as having them attend a workshop." (Embry, 1984, p.23-24). Limbourg & Gerber (1981) also insisted that whilst their program (Tubingen) consisted of a film and a printed brochure giving concrete instructions of what to do in the different stages, the film, was an integral part of the program which always has to be used in training.

There is considerable doubt about the ability to teach very young children how to cope with traffic. Some argue that because they are in traffic at a very early age they should be taught (e.g. Christie 1983; Limbourg & Gerber 1981). Limbourg & Gerber carried out their training program with 2-7 year olds but their evaluation involved 3-7 year olds. They concluded that, amongst other things, the program depended upon the age of the children.

A number of studies involved with Children's Traffic Clubs have demonstrated that the results of the programs not only depend on age, but also on the motivation of the parents which is reflected in the training quality and frequency (Rothengatter 1981b; Limbourg & Gerber 1981).

There is considerable agreement amongst those working with pre-schoolers that children must be taught in a real-world traffic environment and that the use of cognitive methods will not result in behaviour change (Yeaton & Bailey 1983; Vinje 1981; Limbourg & Gerber 1981; Rothengatter 1981(b), Embry 1984). A number of diverse principles are employed but they all relate to behaviour modification techniques and rely heavily on modeling procedures, social learning, operant techniques, etc.

Studies have shown that parents (usually mothers) do not bring about the same degree of adoption of safe behaviours as can be achieved by trained personnel (Rothengatter 1981(b); Limbourg & Gerber 1981; Embry 1984).

One program (Embry & Malfetti, 1981) (see section 7.6), aims to teach pre-schoolers to avoid the street except when accompanied by an adult. Given the proven difficulty in achieving behaviour change with young children 3-4 years old (Limbourg & Gerber, 1981) Embry's attempts not only appeal to practical common-sense but also to observable facts.

As mentioned in section 7.6, the great merit in Embry's approach is its empirical nature. To use his terminology it employs "formative" evaluation not "summative" (Embry 1984) so that every step in the program is systematically evaluated along the way and altered where necessary; not at the end when "no statistical difference" result normally emerges.

Children's Traffic Clubs are a vehicle for reaching mothers and children in those countries where they exist. Usually they reach only a significant minority. In Australia, such clubs appear to be unnecessary since many 4 year olds and most 5 year olds attend pre-school kindergartens or child-care centres. The evidence is overwhelming that parents need at least a detailed demonstration of the way they should interact with their child in the behavioural training. Television, aimed at young mothers, would appear to offer a practical means of achieving the necessary demonstration. Rothengatter (1981b) points out that, in Holland where around 90% of children attend pre-schools, the failure to involve whatever forms of schooling exists, before primary school age, is a major failure of Children's Traffic Clubs.

8.534 Recommendations

Pre-school behavioural training ought to be commenced in Australia employing proven principles and techniques of behaviour modification.

- The training ought to commence with 4 and 5 year olds. To attempt to teach 3 year olds or earlier could be counterproductive and is of doubtful value in terms of its cost-benefit.

- Parents must be involved. Stand alone mail-out material will not be effective. They need to attend demonstrations via film or workshop.

- For 4 and 5 year old pre-schoolers the training ought to involve safe behaviours, and in the opinion of the author, the Embry & Malfetti (1981) approach of minimising entries into the streets, whilst unaccompanied by an adult, should be adopted after further assessment.

* Given the large proportion of capital city children aged 4-5 attending formal pre-school facilities any program should commence with pre-schools and involve parents and teachers.

* Attempts to develop safe road behaviours by parents with very young children is of dubious merit because of the inability of the child to cope and the inability of the parent to adequately model the correct behaviour without practical demonstration as part of their training.

8.532 Primary School

A number of primary school programs exist in Australia. To the author's knowledge none have been evaluated. The exception is the N.S.W. program which has only been evaluated in part; viz., in terms of its users - the teachers.

No recommendations can be made in this area since no empirical data exists. However, on the basis of observation it appears that Victoria's "ROADSWORK" is a superior program to the N.S.W. "Road Safety and Me", at least in terms of its usage to date. South Australia recently adopted ROADSWORK as part of its "Tunnel Vision" campaign. The use of the N.S.W. material appears to be less than the use of ROADSWORK. Schreiber and Berry (1978) found a lack of pupil interest in the N.S.W. program and this, they claimed, was related to teachers' poor use of the material. They concluded that teachers needed to be trained in the effective use of the material.

It is clear that the material currently available is in need of assessment. In this regard accident reduction is not a valid criteria. Observations of safe behaviours are more appropriate. Furthermore, generalisation of these safe behaviours to a number of environments is critical. This element is stressed in the empirical approach employed by Embry but appears not to be incorporated in the European studies (Rothengatter 1981(b); Limbourg & Gerber 1981).

Primary school teachers are critical of the lack of film or video-tape material on road safety. The A.B.C. school broadcasts would appear to provide an opportunity. However, much more needs to be done. A video-tape series, if carried out properly, can reach a large audience and over a number of years.

8.533 High School

At the moment, curriculum units exist in some states. Victoria appears to have made considerable progress in developing units. Again, no assessment exists in relation to these units. The Federal Office of Road Safety has also prepared classroom teaching aids in booklet form. This latter material needs assessment in terms of distribution, acceptance, usage and perceived benefits.

Given the problem of young drivers, the author believes that there is a real need to develop material young people can relate to. In this regard the New Zealand ROADSHOW program ought to be evaluated. The medium is impractical as a means of reaching many young people, but the content and idiom could easily be adapted to a video presentation. It remains to be seen if such an adaptation can be successful.

8.54 Other Suggestions

The following suggestions are put forward for further consideration:

- Child Training Harness
- Vehicle Reversing Signal
- Community Agenda Setting.

This potpourri of ideas is postulated on the grounds that it is important to take a broad look at the total problem. This does not mean, however, that anything and everything ought to be implemented. Embry (1984) questions the conventional wisdom summed up in the statement "something is better than nothing, in developing accident-prevention programs". In the past, medical practitioners bled people because society believed something was better than nothing. The three following ideas are postulated as thought starters and need careful discussion and/or evaluation.

8.541 Re-Introduction of Child Training Harness

Some forty-years ago in Australia it was the 'norm' for mothers with young children to be seen walking the streets with their young child in a harness. In those days there were considerably fewer cars. Mothers and children did more walking. Public transport was also frequented by mother and young child.

Today, there is a new scenario. Mother drives young child everywhere. The traffic has increased dramatically in volume and speed.

The author intuitively relived his own childhood experiences whilst conducting the project which raised the question "why not child harnesses?" Such a question reflects the changes in values in society.

Two questions need to be raised. First, would their widespread use result in safer road behaviour for the youngest age group (under 3 years)? Second, would parents and children use them?

To the author's knowledge, there is no data available to answer the first question. However, it would be quite easy to develop such data using the empirical approaches employed by Embry and his team where multiple-baseline studies are used with only a few children needed and studied over time. Such an approach could study the effect of the harness and the effect of the harness together with a reinforcement package such as Embry's "Safe Playing Book", etc.

With respect to the second question, Dr. Spock has had a profound effect on the values of today's parent. The child is king or queen. Childhood is venerated, not adulthood. In chapter 7, the results of the qualitative study revealed negative attitudes by mothers (and teachers) to the introduction of harnesses.

At the moment, there is a prevailing sentiment which would suggest that harnesses are viewed as "leashes". The name says it all. Embry has suggested that the word "lifelines" might be a more appropriate name. In the United Kingdom, they are called reins. Sadler (1969) in her large survey of mothers in England, Scotland and Wales found that, for their sample of 2-4 year olds, 57% of mothers had some experience with "reins". In her survey the majority of children had ceased wearing reins by their third birthday and many before their second birthday.

The use of a harness/reins/life-line/leash is not unknown in Australia in 1984. One of the experts interviewed in this study used them despite snide comments by friends to both he and his wife. Mothers and fathers have no hesitation in using them in a high-chair.

Assuming that they can be proven to be effective in reducing unsafe road behaviours, the question remains can parents be persuaded to use them? This too is an empirical question. However, another question must also be asked. Is it possible to design a harness for a variety of uses including, the high chair, walking, and the car? The adoption of harnesses is, to a degree, dependent upon this development.

Assuming a universal harness can be made at an affordable price how can its adoption be implemented? The task is no greater than currently being faced in bicycle helmet usage. Indeed,it ought to be easier. If it is deemed a desirable countermeasure then a variety of approaches need to be developed and assessed. Again, the most likely successful approach will be positive modeling with a known presenter respected by women - "A Lady Di"!

8.542 Vehicle Reversing Warning System

A significant number of children are involved in accidents with reversing vehicles. Whilst all vehicles have reversing lights, most don't have an audible warning signal. The author raises the question would some of the accidents which occur have been avoided if an audible signal had been transmitted? Admittedly, young children are sometimes mesmerized by moving vehicles. Nonetheless, the idea is put forward as an inexpensive vehicle design possibility which could impact on some potential road accidents.

8.543 Community Agenda Setting - Altering The Climate of Opinion

Road safety is low on the community's agenda. Opinion Polls, as published by McNair (Gallup) suggest that most people rarely volunteer road safety as an issue.

TABLE 95 COMMUNITY CONCERN ABOUT AUSTRALIA'S PROBLEMS January 1984

Problems*	Percent
Youth unemployment	40
Drug taking or drug trafficking	16
Inflation	10
Violence	7
Union power	5
Sexual attacks	4
The road toll	4
Excessive use of alcohol	3
Uranium mining	3
Defense	2
Loneliness	2
Equal opportunity	1
Smoking	1
Others e.g. education, build-up of nuclear arms, aborigines, health care, superannuation tax, racial prejudices, moral degeneration	2
Don't know	2

Source: Australian Public Opinion Polls (The Gallup Method) McNair Anderson.

• A prompted list of 13 problems.

Road safety when raised, like "motherhood", is of much importance. But, is it likely to be raised? In the opinion of the researcher, road safety currently lacks salience. It need not. Drinking and driving has salience in 1984, at least in some states. It is possible to change the community's agenda?

The problems associated with children and road safety reflect the community's attitudes towards road safety. It can be changed over time. The value of increasing the salience of road safety is beyond question. If the community felt strongly about road safety then legislators are able to enact legislation which under normal circumstances may not be possible. For instance, seat belts were not made compulsory until their voluntary level of acceptance reached a reasonable level. Currently, safety helmets could not be made compulsory. If raising the salience of road safety is a goal it is imperative that authorities set the agenda so that the climate of opinion reflect what needs to be done and the solutions known to work.

Some of the countermeasures proposed in this chapter require a much higher level of community concern over children's road safety than currently exists. Joscelyn and Jones (1978) recommended that priority should be given to improving the use of existing knowledge about the traffic risk and methods for managing that risk.

Three suggestions can be made to increase the salience of child road safety in the community's agenda.

First, there is a need to increase the awareness of child road accidents, and especially child road deaths. More effort could be made to gain space in the "News" (whatever the medium) in relation to countermeasures which could be effected which might have saved the child's life; i.e., Road Safety Authorities need to try to influence what facts are reported so that attribution of blame relates to road safety priorities.

Second, an opportunity exists to use existing favourite television programs. "A Country Practice", for example, is very community and social minded and reaches a large audience of parents, teens and children. The program directors might be amenable to the occasional inclusion of road safety issues, especially those involving children. For example, a bicycle accident and parental demand for "Bike-Ed" could result in a massive increase in demand for "Bike-Ed".

Third, direct approaches could be employed, such as letters to parents seeking their interest and/or co-operation in road safety. Parents are interested. They need to be mobilised into activity. They can be persuaded to take part in activities relating to their child, their child's school, and the roads in their neighbourhood. Parents could be persuaded to monitor the unsafe practices in their neighbourhood; to demand bicycle education for their children; etc.

No recommendation is being made regarding a mass media campaign aimed at agenda setting or increasing salience. Such a process is likely to be very expensive. A good campaign could increase salience but the alternatives proposed thus far are likely to be more effective and less expensive.

8.6 Conclusions

This detailed review has attempted to reveal the complex nature of road accidents involving children. It is meaningless to consider the problem of children and road safety as a single problem. It is convenient to refer to "children" as a group. In reality, there is a world of difference between a young child and a teenager in their road behaviour, their exposure, and their abilities to adopt 'safe' behaviours when dealing with traffic.

The diversity of different problems which, in part, contribute to the total child road accident picture leads to the need to suggest a number of entirely different possible countermeasures. No single countermeasure will solve the problem. Similarly, no one age or road user target group hold the key to solving the problem in total. An essential part of the analysis in this review is that attention needs to be given to directing countermeasures to road users other than children.

In keeping with this perspective, the following countermeasures were proposed earlier in this section of the report.

Countermeasure	Primary Target
Child Restrain Mass Media Campaign	Adult drivers Young drivers Teenage passengers
Adult/Child Restrian Mass Media Campaign	Adult & Young Drivers Adults as Pedestrians Adults as Parents
'Bike Ed' & Helmets	School aged children Parents/Drivers/Schoolteachers

Graduated Licensing	Novice Drivers Teenage Passengers
Changing Status of Residential Streets	Adult Drivers Novice Drivers
Lowering Vehicle Speeds in Neighbourhood Streets	Adult Drivers Novice Drivers
Pre-School Education	Mothers/Fathers Pre-Schoolers
Primary Education	School teachers Child Pedestrians & Pedal cyclists
Secondary Education	Pre-Driver Age Teen Passengers
Child Harness Training	Mothers/Fathers Drivers Very young children
Vehicle Reversing Warning System	Drivers Child cyclists & pedestrians
Community Agenda Setting	All Adults Politicians and Decision Makers

The child, as a road user, is in reality a whole series of different types of children involved in a variety of road user behaviours. Progress is more likely to be made if it is recognised that it is a series of different behaviours and that it is not just the child behaviours which need to be altered. The adoption of 'safe' behaviours by all road users could impact substantially on the child road accident statistics. The adoption of these 'safe' behaviours can be assisted by a range of countermeasures including:

- mas media publicity
- specific child education programs
- town planning/engineering
- legislation
- enforcement.

In sum, the target for most of the countermeasures is not the child, but other road users.

9.0 IMPLICATIONS FOR RESEARCH

This final chapter attempts to outline those areas in which further information seems desirable if gains are to be achieved in existing or suggested countermeasures. The suggestions for further research reflect the author's assessment of the current situation. The emphasis is almost exclusively on the need for further information.

9.1 The Heuristic Nature of Research

The previous eight sections have attempted to detail what is known about children and road safety. In the process of sifting and organizing knowledge, the researcher faces a large number of unanswered questions. Each piece of knowledge tends to raise a whole series of new questions, many of which remain unanswered.

Road safety professionals tend to be conceptualisers or implementers. The foregoing analysis has tried to encompass the domain of both the 'thinkers' and the 'doers'. Such a distinction is, of course, unfair. However, for some people, carrying out more research is an excuse for not implementing a program.

The purpose of this final chapter is largely heuristic. It is not intended to be exhaustive, but is intended to be comprehensive. Many of the suggestions to be made were unforseen at the beginning of the analysis. Some will be regarded as esoteric, others might appear as unnecessary. The selection of areas worthy of further investigation reflects the author's value judgements and those of Mr. Wayne Perkins who painstakingly poured over the detailed of the draft manuscript raising numerous questions. It was his questioning that lead to the inclusion of this chapter.

9.2 Road Accident Data

9.21 Exposure

At the outset, the analysis undertaken in this report has suffered because of two important defects. First, exposure data is largely non-existent. Accordingly, most of the analysis is based on accident data with no computations for estimates or risk. It is recommended that a comprehensive exposure study be undertaken in order to ensure that accident data is seen in its correct context. It is also recommended that the large scale study (Jamieson, et.al. 1981) which has only been briefly reported to date be completed and made available.

9.22 Organisation

Reviews and studies like those reported in this volume are costly largely because of the difficulties in physically obtaining access to data. Some states have computerised mass data systems which can be accessed and used for analysis. Some states centralise their complete accident record including all relevant data (e.g. Police Accident Report Form, Coroner's reports, witnesses depositions, hospital report, etc.). This lack of any centralised Australia-wide statistics was highlighted as the very first conclusion of the most recent Report of the House of Representatives Standing Committee on Road Safety (HORSCORS, 1984).

9.23 Standardisation

The lack of centralisation results in massive amounts of time being necessarily used to achieve any analysis. However, even when data can be obtained, it is often inadequate because of the lack of standardisation which exists between the states.

9.24 Critical Variables

An examination of Police Accident Report Forms and/or whatever other data is available with respect to an accident, regularly fails to provide sufficient data upon which sensible analyses can be undertaken. The solution is not necessarily more information on the Police Accident Report Form. At the time of the accident, emotions are likely to be involved. The Police already have a difficult task. What is needed is an orientation which seeks to maximise the search for relevant causal factors. Whether this can best be achieved by better report form design, or better training, needs further investigation. This orientation, which may or may not require changes in the Police Accident Report Form, would ensure better information in relation to, for example, what the child was doing for the hour or so preceding the accident and where and why he/she was going when the accident occurred. This type of data would also be extremely useful for accidents involving adults; e.g. where had a drink-driver been drinking and with whom; etc. Subsequent research may indicate that crashes involving serious injuries or fatalities require special follow-up reporting rather than additional reporting at the time of the accident. Such follow-up interviews may involve an interview guide or topic list based upon what road safety researchers need to know.

9.3 Normal Behaviour - The Big Gap

Whilst some overseas studies exist, no Australian data appears to be available which can provide a picture of normal child road behaviour patterns (see 7.3 and Grayson 1981). There is a need to know more about:

- how children behave on roads normally?
- what parents believe is the normal pattern for their own children versus other children?
- what parents normally tell or teach children about road behaviour as pedestrians or as pedal cyclists?
- what effort parents put in to the task of teaching their children?
- the importance parents attach to the task of teaching their children?
- what barriers parents feel they face in the task?
- what language children use to describe their road behaviour and the environment of the road?
- what language parents use when dealing with children in respect to the road?
- what is the child's and the parents understanding of the risks associated with using the roads?
- what rules do parents establish about playing (crossing) using the road and why?
- how do such rules vary between parents, and what factors account for this variability?
- how do children actually behave in response to these rules?

9.4 Driver Perception of Child Road Behaviours

An important argument, proposed in the analysis reported in this volume, is that drivers are not as vigilant as they could or ought to be in the presence of children in the road system. The emphasis on reducing vehicle speeds in residential streets is proposed (see 8.51 and 8.52) as a measure aimed at slowing drivers down and also at assisting in increasing their awareness of the presence and danger of children. The importance of local neighbourhood streets in child accidents is documented in sections 3.2; 4.318; 4.337; 4.347; 8.51; and 8.52.

A considerable body of evidence exists which suggests that drivers are as much to blame (see section 8.51) as are children, even though in most instances the driver is likely to be excused because of the seemingly unpredictable behaviour of the child.

Further research is needed into driver's expectations and beliefs with respect to child road behaviour. Such research needs to take account of a whole range of factors including:

- years of driving experience and/or age of driver,
- time of day,
- normal driving patterns (e.g. do males who normally drive to the office behave differently from others),
- sex of drivers, etc.

9.5 School Education

The analysis has highlighted the lack of road safety education in the school system at least as far as N.S.W. is concerned. A much more thorough study is required to answer the following:

- How do children of various ages perceive the traffic environment in general?

- How do children of various ages perceive traffic education material?

- How do children perceive specific aspects of the road environment they have to deal with?

- How do schoolteachers perceive road safety education?

- How do teachers use existing materials, if at all?

- What do teachers need or want to do a better job?

- What importance do they attach to road safety education?

Why do some teachers teach road safety and others not? Why do some use the materials supplied and others not?

What differentiates teachers in terms of the quality of their road safety teaching?

How can the quality be improved on a large scale? What could be done to achieve this end?

Do teachers (and parents) favour more road safety education within the school curriculum (see 6.42)?

Would teachers welcome TV school-time programs which model the desired 'safe' behaviours?

Would teachers (and parents) appreciate TV programs for themselves which aim at teaching (modeling) how to implement and overcome resistances when teaching?

9.6 Enforcement of Child Restraint Laws

The pilot investigation in this volume suggests that mothers, in particular, desire much greater levels of enforcement than currently exists. They also believe the onus ought to be on the driver, especially as far as children and teenage passengers are concerned. Further research, with much larger samples, is required to verify these observations since enforcement is clearly crucial to the achievement of higher levels of compliance. If such higher levels of compliance are achieved, then the impact on child road casualties is likely to be substantial, since the single biggest source of child road casualties is passengers.

If the community respect and even desire enforcement of child restraint laws, then such knowledge may prove helpful to motivating the Police to be more vigilant with respect to this matter.

Research in this area also needs to measure community awareness of the law as far as it concerns responsibility for restraint usage. The small-scale investigation in section 6.34 suggests quite high levels of incorrect knowledge and/or confusion. Public education may be needed.

9.7 Bicycle Helmet Acceptance by Children

Except for Victoria late in 1984, the incidence of children wearing bicycle safety helmets is extremely low (1-2%). Accordingly, continuing research is needed to understand how to make helmet wearing more desirable or acceptable to the child.

The success of the Victorian campaign thus far, has been due to bypassing the child and aiming at parents and educators. Once bicycle helmet wearing rates in Victoria reach a threshold (say 40%) it is likely that the target audience will also need to include the children themselves. Thus, more research amongst children is needed to assist the adoption process at the early stages of adoption for states other than Victoria. Additionally, research is needed amongst children to establish what "triggers" can be used to move the diffusion process on from 'innovators' and 'early adopters' to the large majority of child pedal cyclists. The latter research, at the moment, could only be carried out in Victoria.

Given the size of the small-scale studies carried out to date, further research is needed into the problems parent's perceive they face with regard to bicycle helmet acceptance and usage.

Finally, the seeming early success of the Victorian campaign directed at parents should not be seen as the only solution. To date, little or no evidence exists as to incidence of helmet usage after school after the child has arrived home and goes out to play, nor at weekends. Much of the success, thus far, could be due to the applaudable mandatory practices of schools, rather than the more direct efforts of parents on their own children. Thus, future research on wearing rates must look beyond the trip to and from school on weekdays.

The author has argued that not enough effort has gone into helmet design from the point-of-view of the child. Helmets are a "turn-off" to the child. Research is needed to overcome this problem and, if necessary, to modify the standards at least with respect to colour and finish or outward appearance.

9.8 The Role of Hearing in 'Safe' Road Behaviours

How important is hearing as a critical cue? Are there sex differences in hearing? Can these help to explain why boys are more often involved in accidents crossing roads and especially from behind parked cars given the current knowledge on exposure (see section 2.5)? Little seems to be known about hearing as mentioned in section 5.72, yet it seems likely that hearing is critical - a car noise acts as an aversive stimulus for avoidance behaviour, such as stopping or looking. Children are likely to use noise as a cue. Early experiences on the road are likely to result in noise and cars (which scare them) being paired so that noise acts as a discriminative stimulus. The task analysis research of Rottenggatter, van der Molen and others (see 5.72), does not refer to hearing in their head movement analysis, yet it is likely that it is critical in avoidance conditioning in a naturalistic road environment.

Currently, in road safety literature, considerable emphasis is placed on children's abilities (or lack of) to cope with traffic. Whilst these must be taken as given, children can make judgements and can be trained to develop 'safe' behaviours. For example, if it is believed that the critical 'safe' behaviours to be developed are first stopping, then listening/looking then these critical behaviours are available to children of very young ages. They have something to do with the developmental process, but equally they have something to do with the contingencies in the environment, many of which can be controlled. By adopting a developmental stance, researchers have tended to place too little emphasis on understanding the environmental influences.

9.9 Other Important Research Issues

9.91 Street-Entering Behaviour

The viewpoint of this research volume is that the education of very young children (pre-schoolers) ought to aim at teaching children not to enter the road without an adult (see 7.6). Whilst the efficacy of such a strategy may be a debatable issue amongst road safety educators, it is necessary to establish how the community of parents feel about this matter. How many parents agree with such an educational aim is important if a Safe-Playing program, such as that recommended, is to be considered.

9.92 Local Neighbourhood Traffic

Considerable attention in this volume has been devoted to the need to control speed in local neighbourhood residential streets. A variety of countermeasures are suggested. It would be extremely useful to study the processes by which local councils make decisions with respect to road safety issues.

9.93 Media Reporting of Accidents

A study is needed into the way in which the media report accidents. In particular a content analysis needs to be undertaken to establish what themes are likely to be reported, including key road safety initiatives such as wearing seat belts. It would be valuable to study journalists, writers, editors, producers, etc. to establish what they regard as being "newsworthy". In addition, the media's reactions to press releases by Road Safety Authorities would be most useful.

9.94 Distraction of Young Drivers

Only one study (Ruch, et.al. 1970) could be found in which drivers admitted that the presence of other young passengers acted as a distraction and thus a precipitating factor in accidents (See 8.44). Given the enormity of the problem of teenage drivers and teenage occupant casualties, further research on this issue would appear to be vital. Furthermore, it should not be restricted to teenage or novice drivers.

9.95 Bicycle Design

Studies of children's performance on bicycles suggest that, in addition to maturation and practice skills, there is a need to look at the design of bicycles for children (OECD 1983, Arnberg et.al. 1978).

9.96 Long Term Effects of Road Trauma

Last, but not least, there appears to be no information with respect to the consequences of road accidents to children. Whilst the economic loss of a child road death is assessable, the trauma to the surviving child does not seem to have been studied. Do children remain effected physically and/or emotionally for many years? If road accidents involving seriously injured children were reduced, what positive effects would this have on the child and the community - both economic and social?

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Accident Type	Sex	Age	Year

No.

INFORMATION SHEET

CAUSES: FATAL ACCIDENTS - ROAD - CHILDREN

Tick (one)		Office Use
1.	State: N.S.W., VICTORIA, Q'LD.	1.
2.	Year: 1981 1982	2.
3.	Type: 5 Car Passenger; 4 Pedestrian; 3 Cyclist; 2 Motorcyclist; 7 Pillion Passenger.	3.
4.	Age:	4.
5.	Sex:	5.
6.	Date of Death:	6.
7.	Hospital:	7.
8.	Accident No.:	8.
9.	Reasons for death, factors, circumstances, purposes of journey:	9.
	(a) Accident Report:	(a)
	(b) Party at Fault:	(b)
	(c) Police Action Taken:	(c)
	(d) Coronor's Report:	(d)

APPENDIX