

614.8(944)  
TARU RN 5/80



# TRAFFIC ACCIDENT RESEARCH UNIT



CHILD SAFETY IN CARS: THE BACKGROUND  
TO EFFECTIVE EDUCATION AND PROMOTION  
IN AUSTRALIA

by

David C. Herbert,  
B.Sc. (Eng.), M.I.E. Aust.,  
Superintendent,  
Traffic Accident Research Unit,  
Department of Motor Transport,  
New South Wales.



**L083218**

CHILD SAFETY IN CARS: THE BACKGROUND  
TO EFFECTIVE EDUCATION AND PROMOTION  
IN AUSTRALIA

by

David C. Herbert,  
B.Sc. (Eng.), M.I.E. Aust.,  
Superintendent,  
Traffic Accident Research Unit,  
Department of Motor Transport,  
New South Wales.

Paper prepared for presentation at the cancelled Child Safety in Cars Seminar, University of Auckland, New Zealand, intended to have been held 25th to 26th July, 1980.

ACKNOWLEDGEMENTS

Special thanks are due to Ms. Kathleen Freedman for her comments on a draft of this paper. The views expressed in it are those of the author and are not necessarily endorsed by the Department of Motor Transport.

ISSN 0214-9846  
ISBN 7240-4104-4

RESEARCH NOTE: RN 5/80  
JUNE 1980

1 RSTRK

1. A CAUTIONARY NOTE ON PROMOTION.

In such an important area as the restraint of children in car crashes, it is essential whilst developing a programme of education and promotion, that the end object of reducing deaths and injuries be kept clearly in mind. There is no point in running a much praised advertising programme, if as a result more child restraints are not bought. It is useless to sell more safety devices if they are not used frequently and correctly. And it is certainly unprofessional to promote the purchase and use of child restraints that do not improve the chances of surviving crashes.

The starting point is the development of a range of child restraints that work. This paper commences with a review of the history of child restraints in Australia.

The following abbreviated key to child restraint types, based on Australian Standard 1754-1975 (Amended 1979) should be of assistance:

- Type A: Age range birth upwards (usually limited to 6 months).  
Includes infant carriers and restrained bassinets.
- Type B: For toddlers (usually 6 months to 4 years). Refers only to forward-facing chairs with full harnesses.
- Type C: Primarily for older children (say 3 years to 8 years). Refers only to full-harnesses to be used on original car seats or booster devices (Type G).
- Type D: For toddlers. Forward-facing enclosures, guards and barrier type devices.
- Type E: For toddlers. Rear-facing enclosures, guards and barrier type devices.
- Type F: For toddlers. Rear-facing chairs with harnesses and head-restraints.

Type G: Primarily for older children. Anchored booster cushions and self-anchored chaises, for use with lap-sash belts provided for adults. Can also be used with Type C harnesses.

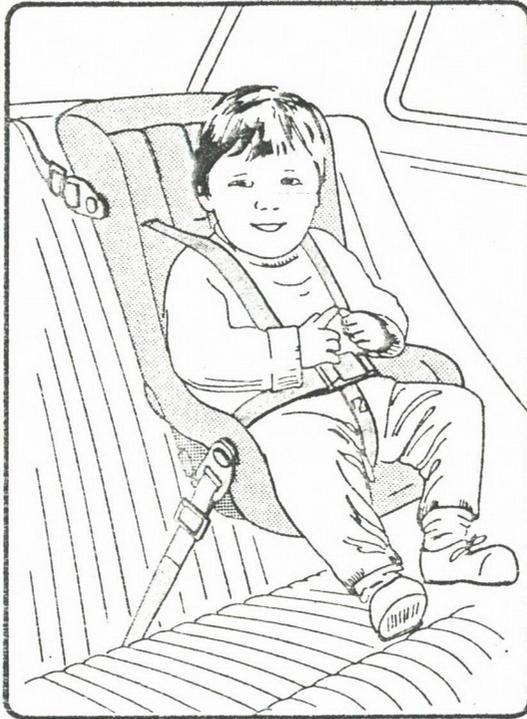


FIGURE 1: British "Jeenay" forward-facing chair with harness.

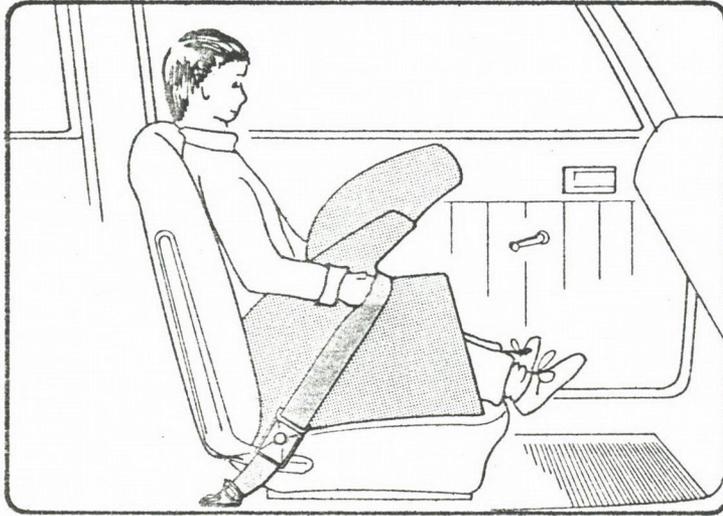


FIGURE 2: American Ford "Tot-Gard" forward - facing enclosure.

## 2. THE DEVELOPMENT OF CHILD RESTRAINTS IN AUSTRALIA.

Sir William Hudson, a famous New Zealander who regrettably died last year, decided in 1960 that the 3000 employees of Australia's Snowy Mountains Hydro - Electric Authority of which he was Commissioner had to wear seat belts when travelling in any one of the Authority's 800 motor vehicles. He gave his research department the job of developing and supervising the necessary seat belt design, construction and installation. He also set an example, by insisting that his official car should be the first to be fitted and thus created a demand from his staff for belts in all the vehicles they used, which were soon fitted out. Having achieved voluntary use of belts by the majority, he then mandated belt use, on pain of suspension from duty. It was an extremely effective operation, changing the habits of thousands of people and saving many lives.

In 1967, with seat belts voluntarily installed and used by SMHEA personnel in their private as well as compulsorily in their official vehicles, the question of devising a suitable form of protection for children arose as a natural development in a very safety-conscious community.

Research staff, by dint of much enquiry and including a private visit to Europe and North America, uncovered two general types of child protective device, both designed for a "toddler" that is, for the child who appeared to be too small for an adult's seat belt but who was sufficiently well developed to sit up unaided. These two devices were the British Jeenay forward-facing chair with harness (Figure 1) and the American Ford Tot-Gard forward-facing enclosure (Figure 2). They formed the basis for Australian Standard E 46 which was published in February 1970 and which included them as types B and D; ordinary seat belt harnesses adapted to the small size of children were designated Type C. A Type E - rear-facing enclosure - was also allowed for, because it was realised that there were advantages in rear facing, but it was not until some time later that the Swedish Volvo rear-facing chair with harness (Figure 3) came to notice, adding a further type that was specifically included as Type F, when the Standard was revised in 1975.

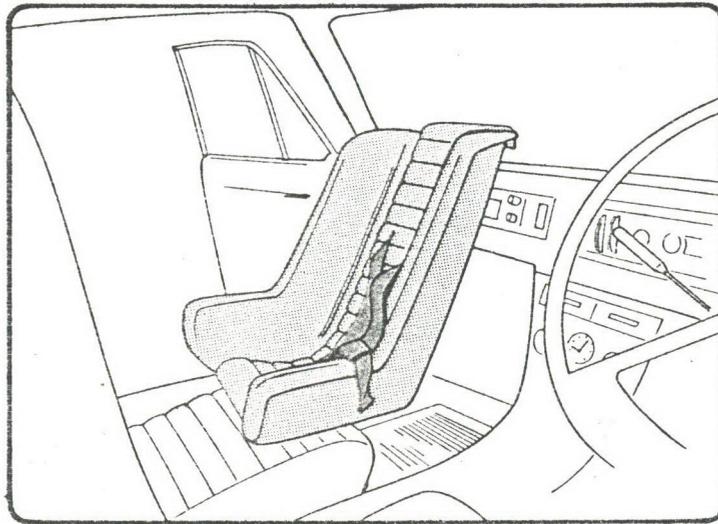


FIGURE 3: Swedish Volvo rear-facing chair with harness.

Early testing of both seat belts and child restraints for the Standards Association of Australia was done by the SMHEA whose research staff produced in 1968 a schematic design for a baby restraint that was included in AS E46 as a Type A device.

Soon after the formation of the Traffic Accident Research Unit in 1969 within the New South Wales Department of Motor Transport, all this testing and development work was transferred to TARU. This led to the establishment of the booster chaise (Figure 4) as a viable adjunct to a lap-sash belt, to convert it into a child restraint suited to children in the 3 year to 8 year age group, and to its inclusion in the Standard as Type G.

The Traffic Accident Research Unit has reported two field studies of the crash performance of child restraints.

In 1976 Henderson reported the preliminary results of an in-depth study of child restraints approved by the Standards Association of Australia which he found were performing well in traffic crashes. In frontal crashes, significant injury was most unlikely, and intrusion of the occupant space was the most important single factor in determining the risk of injury in a given crash. Henderson also found that the use of adult's seat belts by children was not a dangerous practice, and more desirable than the use of no restraint or the use of unapproved child seats which were sometimes positively dangerous.

In 1977 Vazey issued his final report on the above study. He reached much the same conclusion as Henderson but he stressed the importance of proper adjustment of restraints, especially of adult's seat belts when worn by children.

In 1980 Corben reported a six months long study of all children under 8 years of age transported by ambulance from a road crash to a hospital or a doctor. It covered the whole of New South Wales and resulted in 639 crashes being reported. It was conducted in 1978.

The object of this investigation, like that of Henderson and Vazey, was to study the performance of child restraints and belts designed for adults, when worn by children. However, like Henderson and Vazey, and in spite of the large total number of reports, only in a small number (actually 31) of the crashes could Corben be reasonably confident that any child was wearing some form of approved restraint (including adult's seat belt).



FIGURE 4: Lap-sash belt converted to child restraint by use of self-restrained booster chaise.

This 5 per cent wearing rate was particularly surprising because a recent survey by Croft in Sydney had shown 35 per cent of children to be restrained in daytime urban traffic.

A partial explanation for the low wearing rate in crashes was that the crashes might have been predominantly in rural areas whilst the survey was of urban traffic. This hypothesis was tested by Lukin (1979) who checked the home address of every driver who drove a car in which a child casualty was reported to police during 1978. Lukin (Table 1) divided the addresses among four areas namely Newcastle City, Wollongong City, Sydney Metropolitan Area, and the rest of New South Wales, out-of-state drivers being excluded. She found that the child (under 15 years old) casualty rate in Sydney was very significantly less ( $p < 0.001$ ) at 1.6 per thousand population than in "the rest of New South Wales" where it was 2.8. The difference was shown to be roughly similar for the 0 to 4 year, for the 5 to 9 year and for the 10 to 14 year old age groups.

It was concluded that future promotions of child restraints should pay more attention to country-based families and to consumer problems on long country journeys.

Another possible and very attractive explanation for the low occurrence of child restraints in actual crashes, was that most of those children who had been restrained in crashes had not been injured and so had not been transported by ambulance but merely given roadside attention. It is tempting to accept this as the main explanation, but in the absence of better evidence, it is best treated as a partial explanation only. One reason for this caution is that the numbers of children (Table 2) being killed or injured in cars have yet to be shown to be falling as a result of the widespread use of child restraints; it is best to be pessimistic and to assume that the usage rate is not as high throughout the State as the Sydney surveys have shown in daytime urban traffic.

Corben's study revealed 16 children in SAA approved child restraints, as requiring ambulance transport, 12 of whom had less than serious (AIS = 2 or less)\* injury. The 4 with serious injury suffered either less or no more injury than their parents in lap-sash seat belts. Some 37 children wore adult's belts and 30 of these also had less than serious injury. Lap-sash

---

\* AIS = Abbreviated Injury Scale (AAAM, 1978).

belts were worn much too loosely by 2 children, as a result of which they were seriously injured and 2 children wore lap-sash belts in unsurvivable crashes. Lap belts were worn by 3 children who were seriously injured, but lap belts are not suitable for children unless shoulder straps have been added.

The general conclusion from all studies of SAA approved child restraints is that they generally provide even better protection than lap-sash belts provide adults.

### 3. IDENTIFYING EFFECTIVE CHILD RESTRAINTS

The Traffic Accident Research Unit did not start promoting the use of child restraints until an adequate groundwork had been prepared.

An early step was to identify the particular child restraints that were to be promoted. This was done through the Quality Control and Certification Marking Scheme of the Standards Association of Australia, but of course TARU could not use the SAA label until several devices had been approved and made available for sale. This position was reached in 1973 when TARU issued a booklet on car safety for children and also made a movie film featuring Richard Oxenbrough. This film is still used by TARU field officers as a promotional film although it needs replacing by an up-to-date one.

This film showed some of the SAA approved restraints performing well in laboratory simulations of crashes. When the film was made there was little field experience because few child restraints were in use, so performance was judged by adherence or otherwise to the design principles set out in the Australian Standard, and by performance in TARU's crash simulations.

It was very pleasing to discover that every child restraint that complied with these design principles, performed well in the crash simulations.

It was also found that every child restraint that failed to match up to these design principles, performed badly in the crash simulations.

The credibility of the Australian Standard was enhanced further in 1975 when crash tests simulating head-on frontal, side and rear impacts were added to the range of tests in the Standard. By this time the stage was being reached at which one could be fairly confident that compliance or non-compliance with the 1975 revision of the Standard distinguished adequate from inadequate child restraints. The New South Wales Government therefore took the step of banning the sale of child restraints that were not certified by the SAA as complying with their Standard.

#### 4. CONSUMER PROBLEMS

Over the past few years TARU has conducted a continual review of the acceptability by consumers of child restraints made to the Standard. Several research programmes have been mounted by the Unit in this area.

##### 4.1 Child restraint size.

For example in 1976 a study was made of the size of child seats because it appeared that they were not being made large enough for children up to 40 pounds (19 kg) mass and 4½ years age, for whom they were supposedly designed. It was found (Herbert, Lozzi 1976) that some seats were barely large enough for 3 year olds. TARU published the required demensions of seats such that they would be large enough for the largest size of child of the design mass. Although this work has influenced the design of more recently designed restraints, unfortunately many are still made too small, the sizes not being controlled by the standard.

In 1977 Freedman published the results of 1196 household surveys conducted among mother-child pairs. The object of the survey was to determine the attitudes and levels of knowledge of Sydney mothers, and to identify user problems.

##### 4.2 Child's third birthday.

One problem that was identified was that children rarely had restraints available after their third birthdays.

Apart from the restraint size problem already mentioned, there was the economic problem of buying a seat belt for a second child, who often took over the one provided for an older sibling. Moreover, the adult's seat belt was not seen by parents as suitable for the 3 or 4 year old.

These findings led to the formal specification of booster cushions and chaises, designed to allow children after their third birthdays to utilise the lap-sash belts provided in cars for adults. Specifically the booster chaise concept (Herbert, Cutting 1978) was intended to (see Figure 4):-

- . raise the child so that he could see out of the car.



FIGURE 5: Lap-sash belt converted to child restraint by use of restrained booster cushion.

- . push the child forward and up so as to improve lap strap location and to pull the sash away from the neck.
- . take up slack in the belt.

The booster cushion (Figure 5) achieves some but not all of these objectives, and, unlike the chaise which is self anchoring, requires special fittings to anchor it to the vehicle. A loose cushion can of course be quite hazardous. Booster devices also have the attraction of being relatively cheap to make although SAA approved ones retail in Sydney from \$16 to \$39 each.

Booster devices may be used with child harnesses as well as with adult's lap sash belts. They can also be used by children under 3 years old but this is not recommended. Ideally a child seat is the restraint type that should be used from about 6 months to 4 years.

#### 4.3 Child-proofing the buckle.

Another user problem that the Unit has studied is that of child-proofing the securing buckle. Many parents complain that their children either fiddle with the buckle and inadvertently release it, or that they deliberately release it. It has also been noted that some children will slip the shoulder straps off their shoulders anyway, which is just as dangerous. Child training in the use of restraints is clearly important.

Some manufacturers see the importance of child-proofing the buckle. One that uses a push-button release system (Figure 6) has increased the spring tension, so as to make it more difficult for children to release. This unfortunately has also had the side effect of making it more difficult for some adults to release it, which might be significant in certain emergency situations.

Other manufacturers chose to place the buckle at the side of the seat frame near its base, out of reach of the child. One of these has provided a release buckle on each side (Figure 7), so that release can be effected from either side of the car in an emergency. Another has fitted it to one side only, (Figure 8) possibly presenting some problems in emergency release.



FIGURE 6: Australian "Safe-N-Sound Mark 10" forward - facing chair with harness. Central push - button release buckle with strong spring.

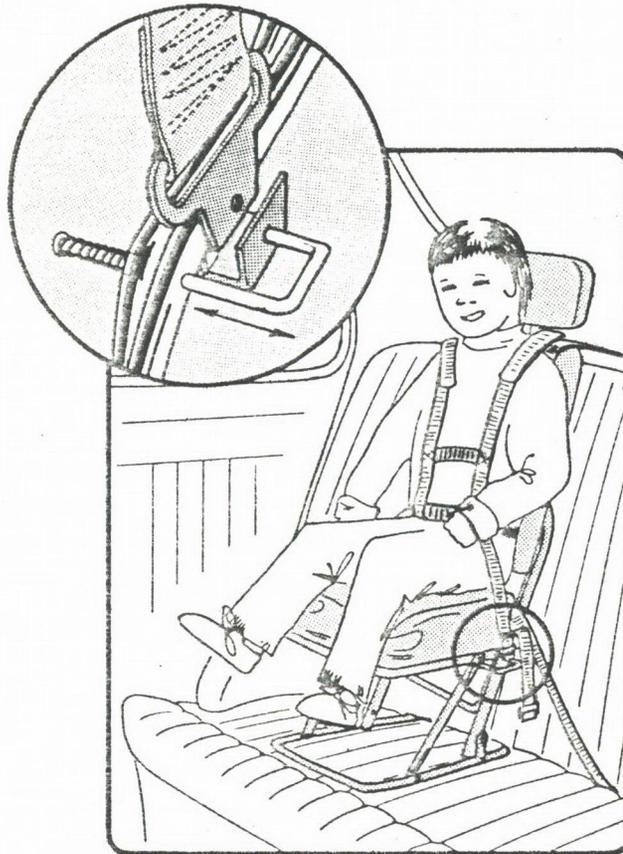


FIGURE 7: Australian "Micklem" forward-facing chair with harness. Has release hook at each side, difficult for child to reach or release, easy for rescuers. (No longer manufactured).

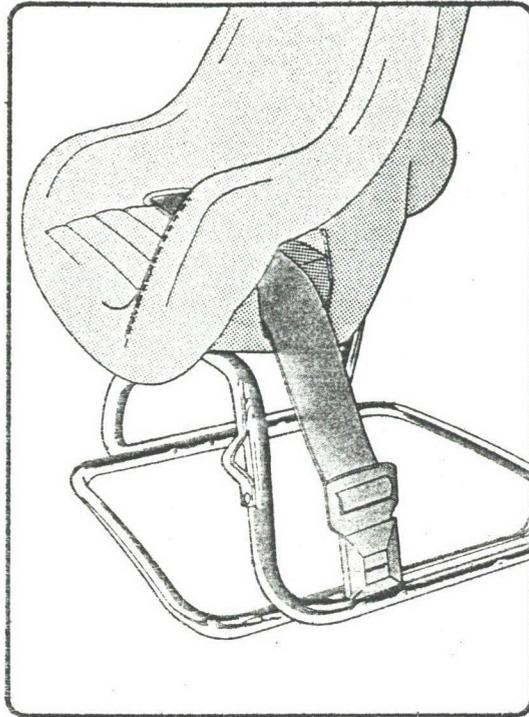


FIGURE 8: Australian "Steelcraft C59" forward-facing chair with harness. Has push button buckle out of reach of child, on one side only.

Release buckles that avoid the simple push button have also been used (Figure 7) but, as Herbert and Corben (1977) have shown, when the consumer has been led to expect push button buckles on seat belts it might be unwise to make emergency release look difficult by providing various alternatives, however well designed they might be from an ergonomic viewpoint.

The most important function of the buckle is however the security of the system in normal use. Humphreys and Freedman (1980) have a report in preparation on their development of objective testing procedures for buckles, covering both child-proofing and emergency release, intended for possible inclusion in the Australian Standard for child restraints.

#### 4.4 Removal of the child in an emergency.

The evaluation of a quick-release system designed for use in an emergency should take into account the real behaviour of rescuers in emergency situations and not merely the imagined behaviour. For example, although designers have gone to great lengths to provide simple-to-use, readily-accessible, quick-release buckles on adults' seat belts, TARU's studies of crashes have shown that tow truck drivers and ambulance crews rarely bother to look for the buckle, but simply cut the straps of the belt in order to remove the occupant. In part this may be because of the unfamiliarity of such rescuers with seat belts, which are rarely if ever used in trucks or ambulances.

Another reason is that the belt wearer is often trapped in the car by deformed metal, and that the car doors and windows cannot be opened, so that rescue has to be achieved by means of brute force methods, rather than by the use of sophisticated release systems that may rarely if ever be used in real crashes.

One reason for having a quick release buckle in a child restraint apart from convenience in normal use and the need for quick release in an emergency, is to give the parent greater confidence in the general safety of the device and so encourage frequent use. It is important therefore to work towards including objective release test procedures for buckles in standard specifications for child restraints.

#### 4.5 Simple installation.

Most designers of child restraint systems have recognised the need to make installation in the car a simple process, preferably to the extent that the restraint can be transferred readily from car to car and from front to rear seat.

American designs have mainly employed existing lap belts for this purpose but, just as lap belts give adults little protection in crashes because they allow the wearer to swing forward and hit his head, so lap belts allow child restraints to move forward and hit the car's interior.

New Australian cars have for many years been required to have lap-sash belts in all four outer seating positions, thus providing a high degree of protection for adults. In specifying the anchorage requirements for child restraints in the Australian Standard, it was desired to provide children with no less protection. Accordingly it was specified that forward excursion had to be controlled by an upper strap. This has proved to be very effective in the degree of crash protection provided.

A side effect of this better protection has been more difficult installation. Indeed some of the earliest Australian child restraints required three or even four bolt holes to be drilled in the car body, making the installation rather permanent as well as very effective.

Car manufacturers objected to holes being drilled in new cars so they agreed to the introduction of Australian Design Rule No. 34 in 1976. This required the supply by the car maker of a small weld nut in the parcel shelf behind each rear seating position, it being assumed that the existing belts (lap-sash in outer and lap in inner seating positions) would be used to secure the base of the child restraint.

Most manufacturers of child restraint decided however to side-step the problem by producing child restraints that required only the lap-sash belt for anchorage. Such belts could be used in the front outer passenger seat as well as in the two in the rear. A top strap was sometimes provided for attachment to the ADR 34 anchorage when the centre seat lap belt was used.

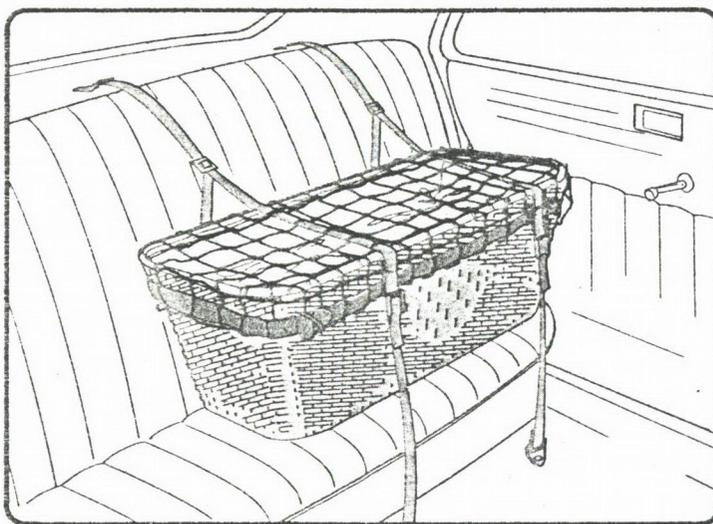


FIGURE 9: Australian "Safe-N-Sound 110" anchoring system for bassinets.

Although these lap-sash anchorage systems provide for relatively simple installation, there is little doubt that they do not control forward excursion as effectively as does attachment to ADR 34 anchorages, and do not always ensure correct installation.

#### 4.6 The sleeping child.

The most popular child restraint in Australia is the Type B, the forward-facing chair with harness designed for toddlers in the age range 6 months to 4 years. Some mothers have complained that when their children fall asleep in these chairs, their throats rest on the shoulder straps and that this can lead to suffocation in normal travel or to neck fracture in a crash.

These fears have been examined by specialists and appear to be groundless.

Some designers however decided to provide for the chair to be reclined so that the child was almost lying on his back, feet forwards. This did give rise to concern among specialists who argued that large forces would be transmitted to the base of the spine in a frontal crash. It was decided to compromise and to permit a maximum 45 degrees of reclination.

Even for the purpose of sleeping, this reclination seems however to be unnecessary. Many children seem to be perfectly able to sleep, slumped forward over the harness.

#### 4.7 Crash protection for the young baby.

Although the Australian Standard provides for crash protection for children of all ages until they can use the adult's seat belts, no Type A restraint, for the use of children in their first 6 months of life, has so far been approved by the SAA. The lack of such devices in the approved list has attracted much criticism to the SAA for having too restrictive a specification, to manufacturers for not being prepared to produce devices that meet the specification, and to TARU for not solving the problem.

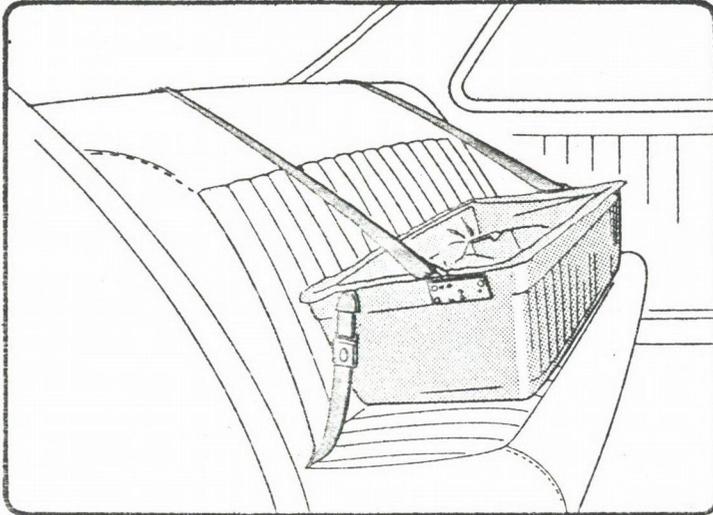


FIGURE 10: German "Roemer-Swinger" baby restraint.

In fact, all three of these groups have been very active but they are expected by some consumer groups to meet other requirements that generally reduce the degree of crash protection that can be provided.

For example, a device designed to cover the first 6 months of life is expected to allow the very young baby to lie flat on his chest to sleep, and the child over 3 months to sit up with some back support. Nursing mothers want to be able to breast feed their babies whilst both mother and baby are travelling protected, and then to be able to put the baby in a protected carry-cot for sleeping. Ideally, mothers would like to move their babies around outside the car, in the same carriers used in the car.

The commonest form of baby restraint in Australia is the bassinet anchoring arrangement. This seems however to move a long way forward on the rear seat and may hit the front seat in a head-on crash, and needs a net over it to prevent the baby being thrown out in some types of crashes. Some mothers have already indicated that they would not be prepared to use a net over a child. Figure 9 illustrates the Safe-N-Sound system.

Another form of this is the Roemer Swinger (Figure 10) which is a swinging bassinet based on the principles first enunciated in the old Australian Standard in 1970. In crash testing however the dummy was thrown against the steel frame of the device, bending it badly. No doubt any child would be seriously injured. This device depends on an anchored vest to prevent the child being ejected. There is some doubt as to whether parents would always use the vest.

The General Motors Infant Carrier (Figure 11) is rear facing and consists of a seat with shoulder harness, neither of which seems suitable for a baby until at least 3 months old.

There is then no acceptable commercial device for young babies. The Traffic Accident Research Unit is however trying to improve on the ones already mentioned, and to experiment with new ideas.

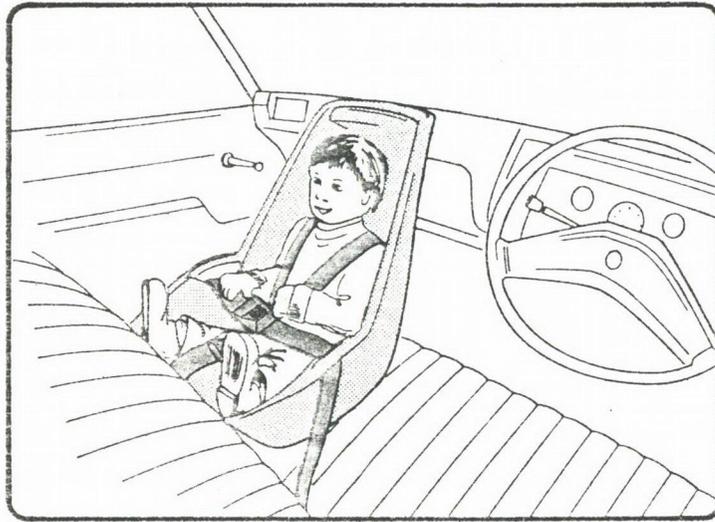


FIGURE 11: American General Motors "Infant Carrier".

## 5. CHILD RESTRAINT USAGE LAWS.

Laws prohibiting the sale of unapproved child restraints are now justifiable in areas where adequate approved restraints are available. For example in New South Wales all restraints except those for babies (for whom none has been approved by the SAA) must comply with AS 1754 - 1975.

Laws governing the use of child restraints are more difficult to justify, even in those places such as New South Wales where adults must wear any available seat belt.

In 1977 however, having established the value and availability of Type B chairs-with-harnesses for children in the 6 month to 4 year age group, and of adult's lap-sash belts for older children, especially when used with the new booster devices, the New South Wales Government made it illegal for a car to be driven with anyone over the age of 6 months unrestrained where a suitable restraint was available in the car. The new law was presented as an educational rather than a punitive measure, to demonstrate the faith of the Government in child restraints. Several exemptions were included, in effect allowing the driver to make the decision to allow a child to be unrestrained if the child's behaviour would otherwise interfere with the general safety of the car. Adult's belts were defined as suitable for children over 12 months. Unrestrained children had to travel in the rear.

Lind (1979) has shown that the law resulted in only a small increase in wearing rate, and a relocation of unrestrained children from front to rear compartments. Overall there was a small improvement in casualties, but she demonstrated that children remaining unrestrained in the rear of the car were still at risk of serious injury and death in crashes.

Clearly the law did not produce major improvements, so revisions are now under consideration.

## 6. EDUCATION IN THE USE OF CHILD RESTRAINTS.

Until 1978 the Unit had used low-key educational efforts to promote the use of child restraints, mainly through the distribution of leaflets in very large numbers, and in showing the Richard Oxenbrough film already mentioned.

Lind's preliminary analysis of the effects of the 1977 usage law, and other data, indicated however that a much more intense effort was required. It was therefore decided to launch a major multi-media campaign the next year 1979, which happened coincidentally to have been declared the UNO Year of the Child.

An amount of \$250,000 was allocated to the 3 month campaign. The advertising agency McCann-Erickson and the film production company Kingcroft were engaged to work with the Unit's behavioural scientists and Information Section to develop the campaign, based on the published research material collected by Freedman and Lukin (1977) from their household survey of mothers.

Five full page newspaper advertisements were produced and entitled with double-meanings:-

CUDDLING BABIES CAN KILL.

HE'S BEEN ON THE WRONG SIDE OF THE LAW SINCE HE WAS FOUR.

CHILDREN SHOULD BE KEPT FIRMLY IN THEIR PLACE.

HE'D FACE DEATH TO SEE MORE OF THE WORLD, and

HAS THE NOVELTY WORN OFF YOUR CHILD YET?

(See Appendix 1 for full texts).

Each advertisement included an appealing photograph of a child.

Two 30 second television commercials were produced, one aimed at children and shown in their prime viewing time; it used a very popular television personality and encouraged children to chant "What about me?" when their parents forgot to secure them. The second commercial was directed at parents, intending to both inform them about child restraints and to make them feel guilty if their children were not restrained.

The newspaper advertisements were run 3 weeks before the television, in order to provide hard factual information as a basis for the attitude-changing commercials to come later. The proportion of children in Sydney daytime traffic, using an approved device rose from 40 per cent immediately prior to the campaign to 55 per cent two months after it, as shown in Table 3.

Date	Wearing Rate	Complying With Law
July 1976	27% *	-
February 1977	36% *	-
November/December 1977	35% *	-
July 1979	40% ≠	56%
October 1979	45% ≠	56%
December 1979	45% ≠	60%
February 1980	55% ≠	67%

TABLE 3: Child restraint usage, Sydney.

It can also be seen that, including children travelling in the rear in cases where there was no restraint available, the proportion complying with the law increased from 56 per cent to 67 per cent through the campaign. It remains to be seen what effect this has on casualty rates in 1980, and whether the campaign needs repeating in order to maintain the improvements achieved so far.

---

\* Any restraint.

≠ Approved restraint.

## 7. CONCLUSIONS

It is concluded that child restraint promotion and education can be successful provided that

- (a) it is based on research into the attitudes of the target audience, and
- (b) it is preceded by the establishment of an adequate power base involving at least four requirements:-
  1. The child restraints being promoted shall readily be identifiable by the consumer, preferably by a label.
  2. The labelling scheme shall be policed.
  3. The child restraints being promoted really do, and can be shown to, give good crash protection.
  4. Any consumer problems of cost, convenience and comfort, as well as unwanted side effects,
    - (i) are identified, and
    - (ii) progressively are removed as they arise.

It is also concluded that the effectiveness of a promotion programme both in reaching and in informing the previously specified target audience should be established and that any child restraint usage legislation should be realistic, not requiring the impossible of safety-conscious parents.

Address of Driver	Casualties	Population	Casualties / 100,000 pop'n
<u>Sydney</u>			
0 - 4 year old	400	237,094	169
5 - 9 year old	397	235,762	168
10 - 14 year old	346	235,110	147
	<u>1,143</u>	<u>707,966</u>	<u>161</u>
<u>Wollongong</u>			
0 - 4 year olds	19	14,691	129
5 - 9 year olds	27	14,918	181
10 - 14 year olds	28	15,836	177
	<u>74</u>	<u>45,445</u>	<u>163</u>
<u>Newcastle</u>			
0 - 4 year olds	23	9,551	241
5 - 9 year olds	16	10,178	157
10 - 14 year olds	27	11,352	238
	<u>66</u>	<u>31,081</u>	<u>212</u>
<u>Rest of N.S.W.</u>			
0 - 4 year olds	401	153,189	262
5 - 9 year olds	483	157,457	307
10 - 14 year olds	447	158,787	282
	<u>1,331</u>	<u>469,433</u>	<u>284</u>

TABLE 1: Child populations and passenger casualties, N.S.W. 1978.

Year	Aged under 8 years		Aged 8 years or more		Age Unknown	Total No.
	No.	% of total known	No.		No.	
1964	17	2.8	593		0	610
1965	25	3.2	758		1	784
1966	24	3.2	725		0	749
1967	18	2.5	688		0	706
1968	21	2.6	791		1	813
1969	21	2.5	773		0	794
1970	32	3.6	849		0	881
1971	28	3.3	832		0	860
1972	27	3.9	674		0	701
1973	33	4.2	751		0	784
1974	26	3.3	771		0	797
1975	30	3.6	813		0	843
1976	31	3.8	794		0	825
1977	25	3.0	811		0	836
1978	32	3.4	901		0	933
1979	24	2.7	853		0	877

TABLE 2: Age distribution of casualties in cars, New South Wales.

## 8. REFERENCES

- . *Australian Design Rules for Safety in Vehicle Designs*, Australian Department of Transport, Canberra.
- . *Australian Standards*, Standards Association of Australia, Sydney.
- . Corben, C.W. (1980), *Children wearing approved restraints and adults' belts in crashes*, NSW Dept. Mot. Transpt., TARU Res. Rpt. IN PREPARATION.
- . Freedman, K. (1977) and Lukin, J., *Occupant protection for children: A survey of restraint usage, attitudes and knowledge*, NSW Dept. Mot. Transpt., TARU Res. Rpt. 8/77.
- . Henderson, J.M. (1976), Herbert, D.C., Vazey, B.A. and Stott, J.L., *Performance of child restraints in crashes and in laboratory tests*, NSW Dept. Mot. Transpt., TARU Res. Rpt. 3/76.
- . Herbert, D.C. and Lozzi, A. (1976), *Child restraint size*, NSW Dept. Mot. Transpt., TARU Res. Rpt. 6/76.
- . Herbert, D.C. and Cutting, D. (1978), *Crash protection for children after their third birthday*, NSW Dept. Mot. Transpt., TARU Res. Rpt. 2/78.
- . Herbert, D.C. and Corben, C.W. (1977), *Human measurements and performance in retracting seat belts*, NSW Dept. Mot. Transpt., TARU Res. Rpt. 5/77.
- . Humphreys, M and Freedman, K. (1980), PAPER IN PREPARATION.
- . Lukin, J. (1979), *Hometowns of child casualties*, Internal memo, Nov. 1979.
- . Lind, B. (1979), *Effect of the law on restraint use and casualty rates*, Internal memo, Feb. 1979.
- . Vazey, B.A. (1977), *Child restraint field study*, NSW Dept. Mot. Transpt. TARU Res. Rpt. 7/77.

APPENDIX

TEXT AS SHOWN IN NEWSPAPER ADVERTISEMENTS

CUDDLING BABIES CAN KILL

Every baby needs cuddling. It can be the most loving thing a mother can do.

Or the most thoughtless.

Cuddling your baby in the front seat of a moving car is courting danger. Crash studies have shown that forces involved in a collision - even at slow speed - are so extreme that your arms would not be strong enough to prevent your child being thrown into the dashboard or wind-screen.

The best place in a moving car for a baby under six months is in a bassinet in the back. While there are no child restraints yet approved by the Standards Association for children of this age, a bassinet held in place on the back seat by a bassinet restraint is the safest means available. An alternative is to wedge the bassinet between front and back seats on the floor. Then, at six months of age, most babies can travel in a child seat.

There may be times when you won't have a bassinet or a child seat. In that situation, nurse your child in the back seat. Wear a seat belt, but only around yourself - never around you and your child.

If you have any questions at all about car safety for your children, call "Safety Information" at the Traffic Accident Research Unit at 662-0111, extension 671.

HE'S BEEN ON THE WRONG SIDE OF THE LAW SINCE HE WAS FOUR

Four is an awfully young age to start living dangerously. But many children around this age, who ride unrestrained in the front or back seats of cars are doing just that.

There is a law in New South Wales that's concerned with the welfare of children in motor cars.

It says that children must use available restraints. It applies to all children over six months; yet it is often ignored when children have outgrown their child seats, from about four years of age.

If there is no child seat or child harness available, a properly adjusted adult seat belt should be worn. With an approved booster cushion, it's safe and comfortable for even a small child.

All the law expects, is that you should provide your children with the same chance for survival that you give yourself.

You wear a seat belt, your child should have the same security.

If you have any questions.....

CHILDREN SHOULD BE KEPT FIRMLY IN THEIR PLACE

The protection of children in your car depends on more than just having an approved child seat, child harness or seat belt.

Correct installation and adjustment are vital. Without them the restraint can cause injury in a collision.

All safety equipment should be securely anchored to the car - according to manufacturer's instructions.

Adjustments should be checked each time your child gets into the car. Straps fitting snugly - even when the child is sleeping - with no freeplay at all. Buckles should be tugged, to ensure they have locked. If adult seat belts are used, and they can be used for children over 12 months - preferably with a booster cushion - the sash should not lie across the face or head.

Your child's safety in the car depends on three things: correct equipment, correct installation and correct adjustment. One is useless without the others.

If you have any questions.....

HE'D FACE DEATH TO SEE MORE OF THE WORLD

The biggest threat to the safety of your child is natural curiosity. Who wants to be tied down in the car with a seat belt, when all those exciting things are happening in the world out there?

There is now a solution to this problem. A booster cushion - for the child who has outgrown his child seat. Held in place by a harness or seat belt, an approved booster cushion will raise a small child to window level.

You can have peace of mind with a contented child - and a safe one too.

If you have any questions.....

HAS THE NOVELTY WORN OFF YOUR CHILD YET?

There was a time when nothing was too good for your baby. The best child seat money could buy. Painstaking attention to strapping her in each time you used the car.

Now that she's older, it doesn't seem as important. She's bigger now. She can look after herself in the back seat.

The truth is, when a child is not strapped in, riding in the back seat is not much safer than riding in the front. In the event of a collision, or even sudden braking, a child would be flung about like a rag doll - into all sorts of sorrowful situations.

When a child grows out of a child seat, it's important to update the safety equipment. A child harness can be used, or a snugly fitting adult seat belt.

If your child can't see out of the window, an approved booster cushion should be used with either of these restraints. That way, your child will be safe - and happy too.

If you have any questions.....