School bus safety - where to from here?

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Abstract

In 1999 ARRB Transport Research was commissioned by Austroads to review current practice and research in relation to school bus safety and to identify new or proven safety measures that may be used as part of a national approach to school bus safety. A key outcome of the study was the development of a draft National School Bus Safety Action Plan. The draft Action Plan, which recognised initiatives being implemented by jurisdictions across Australia at the time, sought to provide a set of countermeasures to reduce the incidence and severity of crashes involving school children associated with bus travel.

In 2001 Austroads established a School Bus Safety Advisory Group to identify and progress issues raised in the earlier study, including refining, prioritising and implementing the proposed draft Action Plan. ARRB was subsequently commissioned to assist in the review of the draft Action Plan.

Key tasks involved in the review included examining recent crash data, reviewing literature and recent developments pertaining to the safe travel of children in and around school buses and documenting the safety practices and initiatives implemented by in each jurisdiction across Australia. Based on research findings, the action items proposed in the draft Action Plan were reviewed and rated in terms of: (a) the priority and effectiveness of the action in addressing common causes of fatalities associated with school bus travel, and (b) the resources and ease of implementation associated with undertaking the activity. A Revised Action Plan that may assist jurisdictions to give priority to those measures, which address the most common cause of fatalities where the greatest gains can be made in school bus safety for children, has been drafted. This revised action plan is currently awaiting Ministerial approval.

This paper will present an overview of the key findings of this study and further report on the status of the Revised Action Plan.

Introduction

In the past four years ARRB Transport Research has been involved in a number of research investigations relating to the safety of children during their journey to and from school. Papers have been presented at this conference in previous years, which have discussed the risk of being injured while travelling in or around a school bus, reported on current knowledge and developments related to school bus safety and identified various initiatives being implemented across Australia. The present paper seeks to report on the key findings of the most recent research, namely the development and revision of the National School Bus Safety Action Plan.

Background

Strong community concern over school bus related incidents resulting in death and serious injury to school children led the Australian Transport Council to request Austroads to review current practice and research in relation to school bus safety. Austroads was also required to identify new or proven safety measures that could be used as part of a national approach to school bus safety.

In 1999 ARRB Transport Research was commissioned by Austroads undertake this research. The main objective was to develop a set of school bus safety recommendations for inclusion in a National School Bus Safety Action Plan. It was envisaged that such an Action Plan would underpin the development of countermeasures in each jurisdiction to maximise the safety of children travelling in and around school buses.

The draft Action Plan was based on an assessment of the magnitude of the problem, current practice, research findings and consultation with key stakeholders and the wider community (refer to *in AP-R186A School Bus Safety in Australia-Technical Report*: Austroads 2001).

The draft Action Plan recognised initiatives being implemented by jurisdictions across Australia at the time, sought to provide a set of short, medium and long term measures designed to reduce the incidence and severity of crashes involving school children that were associated with bus travel.

Revising the Action Plan

In 2001 Austroads established a School Bus Safety Advisory Group to identify and progress issues raised in the *School Bus Safety* Report (see above), including refining, prioritising and implementing the proposed Action Plan. The Advisory Group established an Expert Working Group to monitor the revision and implementation of this Action Plan and ARRB TR was commissioned to assist this group.

The purpose of the most recent research was to review the measures listed in the draft Action Plan and to refine and prioritise these measures based on updated crash analysis, research findings and initiatives presently in place across Australia.

The following key tasks were performed:

- The crash data analysed and reported in previous study was updated;
- A further review of literature and research findings pertaining to the safety of travel in and around school buses in Australia and overseas was undertaken;
- Key stakeholders from Australian jurisdictions were contacted to review the school bus safety practices and initiatives implemented across Australia; and
- A method for rating the priority and effectiveness of each action in addressing the common causes of fatalities associated with school bus travel and in terms of the resources and ease of implementation associated with undertaking the action was developed.

Magnitude of the problem

The review of updated crash data confirmed the summary and conclusion drawn in previous research. The crash analysis has revealed that:

- While the number of pedestrian fatalities has steadily fallen since 1995, total child pedestrian fatalities and child pedestrian fatalities during school comminuting hours have plateaued.
- The number of child pedestrian fatalities associated with school bus travel has continued to fall.
- The typical characteristics associated with child fatalities and school bus travel have not changed.

In order to estimate the magnitude of the school bus safety problem, the project team consulted the Fatality Files maintained by the Australian Transport Safety Bureau. Fatalities in which a school bus was involved could be identified only in the Fatality Files for 1992, 1994, 1996, 1997 and 1998. Examining these files revealed a total of 28 school-bus-related fatalities in Australia for the five years examined, or an average of 5 to 6 fatalities per year.

Table 1: Children aged 5-17 years killed during bus travel to and from school in Australia

How the fatality occurred	Total	%
As a *pedestrian* struck by passing traffic when crossing the road		
- to board a bus	1	4%
- after alighting from a bus	22	79%
As a *bus passenger*		
-Alighting (i.e. trapped in bus doors as they close)	2	7%
-Within the bus (collision with other vehicle)	2	7%
-Other	1	4%
Total	28	100%

Source: ATSB Fatality Crash Database 1992, 1994, 1996, 1997 and 1998

Table 1 illustrates that, based on the fatal crash data analysed in the course of this project, the risk of being struck by passing traffic when crossing the road before boarding or after alighting from the bus is by far the greatest risk associated with travel by school bus. Almost 5 out of every 6 children killed were not travelling inside the bus at the time but were crossing the road to or from the bus.

The available data also indicates that the next greatest risk of fatal crashes, though less frequent, is associated with traveling as a bus passengers when children become trapped in bus doors when they close and are subsequently dragged by the bus or when children are injured within the bus when the bus is involved in a collision with another vehicle. In two cases, the door of the bus closed and trapped the leg of a child who was trying to alight. The driver failed to notice what had happened and when the bus departed the child was dragged by the leg.

In only three cases or 11 per cent of fatalities was the child a passenger travelling inside the bus at the time of the accident. In two of these cases, the bus was involved in a collision with another vehicle and in the other case the child was killed while leaning out the window.

A number of other perceived risks associated with travel to and from school by bus were identified in the literature and through consultation, however the low number of crashes and the absence of injury data at a national level preclude the actual risk of injury from being determined. These perceived risks include:

- Children injured by passing traffic while waiting for bus.
- School bus colliding with children before boarding or after alighting.
- Passengers injured by impacts inside the bus (as a result of collision with another vehicle).
- Other vehicles crashing into the school bus.
- Passengers distracting or interfering with bus driver.
- Collisions caused by mechanical fault or failure in bus.
- Sub-optimal management of passenger injuries after a crash.

Overall, estimates of school-bus-related fatal and serious injuries in Australia were calculated for 1990 and 1998. While the number of fatalities is comparatively small, the decrease in fatalities is supported by a decrease in hospital admissions. Thus it appears that the magnitude of the problem has decreased over time–though this finding should be treated with caution as the number of fatalities that have occurred are small.

- *Fatalities: Who? When? Where? How?*

The available details were obtained from the Fatality File for the 25 fatalities in 1992, 1994, 1996, 1997 and 1998 that involved a child who was not travelling inside the bus when they were killed. Three quarters of the victims were primary school children and just over half were male. Also the majority of fatalities occurred while commuting home from school in the afternoon in fine weather. (The weather conditions are unknown for one case.)

Half of these 25 fatalities occurred in urban areas and half in rural areas. Nearly all occurred away from intersections, mostly on two-way undivided roads, often on roads zoned at greater than 60 km/h.

Of the 23 fatalities related to crossing the road, only one occurred while crossing to the bus. The other 22 occurred while crossing after alighting from the bus. Therefore, the majority of incidents occur in the afternoon, away from school, at the “home” end of the bus trip. This means that any efforts to supervise the behaviour of children in the vicinity of the bus need to be spread over widely scattered locations rather than concentrated at the school end of the trip.

The situation for non-fatal injuries is not clear. However, the available information on fatalities suggests that efforts to control the movements of school children and of other vehicles in the vicinity of school buses may lead to greater safety gains than measures to improve safety while travelling inside the bus.

Review of literature and current knowledge

As exemplified by fatality and injury data, research evidence also indicates that bus travel is a relatively safe ode of transport. The risk of injury to occupants while travelling as a passenger is low. The greatest risk to children travelling to or from school is as a pedestrian moving around school buses.

Despite the evidence that children as bus passengers are relatively safe, there remains a strong perception in the community, by parents in particular that buses pose a greater risk than travel in the family car. Parents are often greatly concerned about the safety of school bus travel. One reason is that seatbelts are generally not available to school bus passengers, despite being required for all car passengers. Perhaps parents are also concerned because they have to trust their child to the care of another person when the child travels by bus.

Debates over the safety of school buses, the risks posed to standing passengers and to three children occupying seating capacity allocated for two adults, the benefits of compartmentalisation, the cost of installing seatbelts and other countermeasures relative to the safety gains that are likely to result are well documented. The research is mixed and the evidence is largely inconclusive due to the low crash risk associated with vehicles. However, much of the research suggests that initiatives, which aim to improve driver and pedestrian behaviour, improve vehicle maintenance and provide safer roadside environments may offer greater potential for increasing the safety of children travelling and around school buses.

Countermeasures/initiatives

The number of different countermeasures being used in various parts of Australia is actually very large. It is convenient to classify these measures into those primarily involving the bus, those primarily affecting the road environment and those directed mainly at the behaviour of bus passengers and other road users.

- *Road users*

Among the most widely applied countermeasures are educational programs aimed at students, their parents and bus drivers; these can include then use of videos seminars and leaflets as well as classroom work with the students. Mass media campaigns, typically just before the start of the school year, are also used to alert other drivers of the risks relating to passing a stationary school bus. Most states and territories encourage parents to collect their children from the same side of the road as the bus stops, rather than allowing the child to cross the road unaccompanied.

Supervision of children is often provided by adults at bus stops at schools, but less commonly at bus stops away from schools. Where supervision of children occurs on the bus, it is usually provided by student monitors. All states have codes of conduct relating to school bus travel for both students and bus drivers.

- *Vehicles*

Most Australian jurisdictions use special signs and/or flashing lights to identify school buses. Some states require the fitting of special mirror systems to provide the driver with a view of the exits and/or of children crossing in front of the bus. All states and territories require emergency exits and dual circuit braking and most require rollover protection. All have requirements for regular inspections and maintenance programs to ensure buses are in good mechanical condition. Some states require door sensors to fitted and interlocked with the vehicle brakes, so that the vehicle cannot move off if the door is not fully closed. Some states have banned the use of buses with rear doors, since it is difficult for bus drivers to monitor children alighting through such doors. Some states impose maximum age limits on school buses.

External speakers, stop signals and mechanical barriers, which are widely used in North America, are not used in Australia.

- *Road environment*

All states have guidelines for the selection of bus routes and the placement of bus stops to ensure that comparatively safe locations are chosen. Some states carry out bus route audits. Indented bus bays and/or pedestrian fencing are provided at stops and interchanges in some locations. A number of states impose special lower speed limits on school buses, while other states impose special lower speed limits on other vehicles passing school buses setting down or picking up passengers. Most states impose special lower speed limits in school zones.

Rating of Countermeasures

In the light of the updated crash data, research findings and understanding of initiatives in place in Australian jurisdictions the draft Action Plan was updated.

In developing and revising the draft Action Plan ARRB Transport Research and the Austroads Expert Working Group worked together to rate the actions and countermeasures that could be potentially included in the Revised Action Plan.

Each action items was examined and where necessary amended or reworded to align with current research to provide succinct, measurable action items for implementation. Completed action items were removed from the Revised Action Plan.

Following this each revised action item was rated across the following four categories:

- *Priority*

Potential actions were prioritised based on the extent to which they addressed the known facts of the school bus safety problem:

A	Actions that addresses the most common cause of school bus related fatalities (based on available fatality data)
B	Actions that may address potential cause of fatalities

- *Effectiveness*

Potential actions were rated in terms of their effectiveness:

1.	Proven and effective action
2.	Unproven action offering promising results/some merit
3.	Unproven action through unlikely to be effective
4.	Action proven to be unsuccessful

- *Resources*

Potential actions were rated in terms of the likely resources required to undertake the action:

High	High level of resources required to undertake the action
Medium	Medium level of resources required to undertake the action
Low	Low level of resources required to undertake the action

- *Implementation*

Potential actions were rated in terms of how difficult or complex it is likely to be to implement each action item:

Difficult	Difficult to implement
Complex	Complex yet achievable action to implement
Easy	Easy action to implement

For each revised action item a detailed justifications for the rating applied was drafted. These justifications drew on the updated crash data, the research findings and consultation findings undertaken as part of this review.

Summary

Based on a combination of these four ratings–priority, effectiveness, implementation and resources–potential actions were given an overall ranking for inclusion in the National Action Plan. The Revised Action Plan has been submitted to the Australian Transport Council–the ministers for transport–for approval.

It is anticipated that the Revised Action Plan will be beneficial in coordinating national efforts and assisting jurisdictions to give priority to those measures which address the most common causes of fatalities and where the greatest gains can be made in school bus safety for children.