Transport Research Laboratory

Improving School Transport Safety

Main report

by N. Kinnear and L. Smith

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Transport Research Laboratory

FINAL PROJECT REPORT PPR543

Improving School Transport Safety

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This report has been prepared for Transport Scotland and SCOTS.

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Background

Following two accidents in which two pupils returning home from school in Aberdeenshire in 2008 were killed, the local authority, Transport Scotland, SCOTS and the Scottish Government have sought to establish clear guidance to inform and promote school transport safety throughout Scotland.

TRL was commissioned to develop a guide outlining current policy and good practice procedures related to school transport safety. The guide is the key output of the project and is aimed at local authorities and others with a responsibility for school transport safety, as a first point of reference.

The guide is available as a separate document entitled 'A Guide to Improving School Transport Safety: Casualty risk, responsibilities and legal requirements, and ten ways to reduce risk on the school journey'.

This report represents the record of the technical work on which the guide is based. It sets out the terms of reference and background for the work.

Activities

The work consisted of four main activities:

1. Analysis of the exposure and risk levels associated with different transport modes used to get to and from school (the main ones being car, bus, walking, cycling); this included consideration of the effects of deprivation and demographic details such as gender on risk, and the likely effects on the total school transport risk in Scotland if modal shift from cars to more sustainable modes occurs.
2. Summary and collation of existing policy and guidance on school transport provision and safety so that this information could be included in one easy-to-access document.
3. Survey of local authorities to establish their knowledge of current policy and whether or not they had constructed their own policy based on the guidance previously received from the Scottish Government.
4. A review of relevant published literature from the road safety and psychology domains, and also a review of evaluation studies run by local authorities and others on specific school transport safety interventions. The literature review was used to provide a scientific basis to inform recommendations to improve school transport safety.

The outputs of the project are the guide and this report. Both of these documents outline existing legal responsibilities and guidance for authorities regarding school transport safety (i.e. the things local authorities **should** be doing), and the key recommendations for improving school transport safety (i.e. what authorities **could** be doing) based on the work carried out.

What should authorities be doing?

School transport policy and guidance has traditionally been communicated to local authorities via guidance circulars. Among this guidance are a number of legal requirements of local authorities and others, such as school transport operators and drivers. The report details up-to-date guidance and legal responsibilities, of which some key points are:

1. Statutory walking distances

- Parents have a reasonable excuse for keeping their child from school if they live more than the statutory walking distance from their designated school, which is two miles for children less than 8 years old and three miles for children aged 8 or over. Section 51 of the Education (Scotland) Act 1980 requires education authorities to make such arrangements *as they consider necessary* for school pupils residing, and attending schools, in their area. This can include:
    - the provision of free school transport for some or all of the journey;
    - making bicycles or other suitable means of transport available to pupils;
    - paying some or all of the travelling costs; or
    - any combination of these.
- Authorities must consider the safety of walking and cycling routes to school for pupils living within statutory walking distances of their designated school. If the routes could be considered unsafe, then transport should be provided, even when distances may fall short of eligibility criteria. Authorities are therefore expected to review the eligibility criteria and have flexibility to consider safety factors such as volume and speed of traffic, availability of safe crossings, sufficiency of pavements, footpaths and subways, built-up and wooded areas and street lighting. Authorities are also expected to consider medical conditions of pupils which may affect their travel to school, and also the medical condition of parents where they may be expected to accompany their child for part or all of a journey.

2. Legal duty of care

- Authorities have a common law duty of care for the safety of pupils under their charge and this duty extends to pupils travelling on dedicated transport arranged by the authority. A duty of care is a legal obligation imposed on an individual or organisation requiring that they adhere to a standard of reasonable care while being responsible for situations that could cause foreseeable harm to others.
- A duty of care for pupils' safety is also covered by the Schools (Safety and Supervision of Pupils (Scotland) Regulations 1990. The Regulations place upon local authorities a general duty, without prejudice to any other statute, to secure, as far as is practicable, the safety of pupils when under their charge.
- Pupils travelling on dedicated school transport arranged by education authorities are under the charge of the authorities, therefore authorities are expected to keep school transport provision under review to ensure the safety of pupils when travelling on school transport.

3. School transport provision

- All post-October 2001 minibuses and coaches must be fitted with seat belts. For the purposes of regulation, a minibus is defined as a motor vehicle constructed or adapted to carry more than 8, but not more than 16, seated passengers in

addition to the driver; a coach is defined as a vehicle built or adapted to carry more than 16 seated passengers in addition to the driver and having a gross weight of more than 7.5 tonnes and a maximum speed of 60 mph.

- Minibuses and coaches built prior to October 2001 used to transport school children must have seat belts installed. For legislation, a seat belt is defined as a minimum of a lap belt.
- Only forward facing seats fitted with seat belts can be used for carrying school children; rearward or side-facing seats cannot be used by pupils for school travel, even if fitted with a seat belt.
- Vehicle operators must now notify passengers that seat belt wearing is compulsory.
- All passengers in minibuses must wear a seatbelt. The driver is responsible for ensuring that passengers aged 3 to 13 years wear a seatbelt. In other buses and coaches, passengers aged 14 years or over are responsible for wearing a seatbelt where they are fitted.
- Minibuses, buses and coaches used to transport school children are required to display the retro-reflective yellow school bus sign at the front and the rear of the vehicle. Signs should be clearly visible to other motorists and should not be placed behind vehicle windscreens. While there is no statutory obligation for operators to remove the signs from vehicles when not being used to transport school children, local authorities are encouraged to make it a requirement for operators to do so.
- School bus signs must meet minimum size regulations (not less than 250 x 250 mm at the front and with a black border not less than 20 mm wide; and not less than 400 mm x 400 mm at the rear with a black border not less than 30 mm). There is no maximum size.
- All drivers, attendants and supervisors on arranged school transport will require an enhanced disclosure check by Disclosure Scotland in line with the Protection of Children (Scotland) Act 2003.

What could authorities do?

In addition to the guidance and legal responsibilities listed above, the report authors suggest ten ways that local authorities can improve school transport safety in Scotland. The recommendations are informed by an appraisal of the evidence contained within the report. The recommendations are not an exhaustive list of safety measures and individual authorities may identify other safety measures specific to their needs. The recommendations suggest ways to address the key areas of child casualty risk on the school journey, while encouraging a holistic and consistent approach across Scotland. For example, were all school buses in Scotland to use hazard lights when picking up or dropping off school children—as they are legally permitted to do—this approach would also require a public campaign to educate school bus drivers, other motorists, parents and pupils of the meaning of this situation.

Local authorities are encouraged to consider how the following recommendations could be used to improve school transport safety in their area.

Recommendation		Target group	Identified risk
1	Reduce speeds on school routes and around schools	Pedestrians and cyclists	Speed is a key determinant in road casualty rate and severity. Any reduction in speed on school routes and around schools will improve pedestrian and cyclist safety. It is likely that this would result in a large casualty

			reduction due to the large number of pupils who walk for all or part of the journey to school. In addition, cycling is the riskiest mode of transport on the school journey so any speed reduction would benefit cyclists and other vulnerable road users.
2	Encourage motorists to reduce their speed when passing stationary school buses	Pupils alighting from the school bus	The most common casualty related to the school bus occurs when a pupil alights from the school bus in the afternoon and crosses the road. A reduction in speed reduction by passing motorists would give them more time to react and reduce severity where a collision does take place.
3	Set minimum standards in school transport contracts	All pupils using local authority arranged transport	There are several risks related to using external operators such as the quality of the vehicles and the experience of the drivers. By setting minimum safety standards in contracts, local authorities can improve and ensure the safety of pupils when being transported to and from school.
4	Risk assess school transport pick-up and drop-off areas	All pupils using local authority arranged transport	School transport pick-up and drop-off areas are often convenient but do not usually benefit from the safety infrastructure or risk assessment accorded to public bus stops. Pupils will often have to interact and stand beside public roads, hence school transport pick-up and drop-off areas represent a potentially significant risk to pupil safety.
5	Review school travel plans, improve communication and clarify responsibilities	Local authorities, transport operators, schools, parents and pupils	Effective school travel plans can be important to improving safety and reducing pupil casualties. Good communication between authorities, transport operators, schools, parents and pupils has been found to be important for a successful scheme. In addition, research has established a void of responsibility whereby parents assume that schools or local authorities are primarily responsible for pupil safety while local authorities see the parent as being primarily responsible.
6	Raise awareness of desired behaviours	All (pupils, parents, bus drivers, motorists)	School transport safety and risks are not commonly available or communicated. There is therefore scope to raise awareness of some desired behaviours to improve safety. However, any communication should be well thought out and evaluated to avoid any unintended outcomes.
7	Promote on-road pedestrian and cyclist training	All pupils	Children's cognitive and perceptual processes are still developing therefore they are at increased risk when dealing with public roads and traffic. On-road training has been shown to be an effective way of increasing safe behaviours. Courses should be implemented as they were evaluated and as recommended.
8	Encourage schools to use Road Safety Scotland's educational material	All pupils	Inconsistent road safety messages can dilute meaning hence authorities and schools across Scotland should utilise Road Safety Scotland's (RSS) full range of educational resources. Some early material requires pupils and parents to plan safe routes to school and the material is designed to blend into the curriculum to create a longer term road safety culture in Scotland.
9	Discourage young novice drivers from driving to school and	Young drivers and their passengers	Young drivers are at increased risk of being crash involved and crash risk increases with each teenage passenger in the car. Young drivers should either be supervised (e.g. by parents) when driving to and from school or discouraged

	transporting others		from driving to school to reduce the risk to themselves, their passengers and other road users.
10	Evaluate all interventions	All	Some well-meaning interventions can actually increase casualty risk. It is therefore essential that all interventions to improve safety are evaluated to determine if they are achieving their desired outcome and are not increasing casualty risk.

Abstract

School transport safety is an important topic if Scotland is to make headway towards its Road Safety 2020 targets. This report details work carried out by TRL to answer what local authorities should and could be doing to comply with their legal responsibilities regarding school transport safety, and to lower pupils' casualty risk, based on the evidence reviewed. Very large numbers of people (around 680,000 pupils, plus any accompanying people such as parents) are exposed to transport risk on 'the school run' during school terms times; analysis of exposure and accident data suggest that the majority of this risk is borne by the 50% or so of pupils who walk to school, although the highest risk per unit exposure is for cyclists. It is suggested that any modal shifts sought in pursuit of sustainable transport targets should be carried out in the context of lowering the risk of sustainable modes – in particular walking, cycling, and road crossing around bus pick-up and drop-off points. Legal responsibilities and guidance are presented, and ten recommendations regarding interventions for increasing school transport safety are provided. These recommendations address the key areas of casualty risk on the school journey and promote a consistent and holistic approach across Scotland. The recommendations are: reduction of vehicle speeds around schools; reduction of vehicle speeds around stationary school buses; minimum safety standards in school contracts including minimum driver experience and age, and ensuring seat-belt usage; risk assessment of school bus stops; improved communication of responsibilities to parents,, pupils and other motorists; raised awareness of desired behaviours; promotion of on-road pedestrian and cyclist training; utilisation of Road Safety Scotland's educational materials; discouraging young and inexperienced drivers transporting others to and from school; and encouraging evaluation of all changes.

1 Introduction

1.1 Background

Every day around 680,000 pupils make their way to and from the 2,722 schools that cover the length and breadth of Scotland (Scottish Government, 2010). Covering a range of geographical locations, these pupils make the journey to school on foot, by bicycle, bus, car, train, ferry, or a combination of different modes. On almost all routes to school, pupils will use or encounter the public highway and interact with other transport modes. For the vast majority of pupils the journey to and from school is completed safely and is part of a normal daily routine; however, a road traffic accident on just one of these journeys can have tragic consequences. Injury or fatality as a result of a road accident impacts not only those involved, but family, friends, schools, communities, and Scotland as a whole.

Children and young people are at increased risk on the road due to their age and inexperience. During early development, children can fail to accurately assess the road environment and their interaction with other road users. Children learn from experience and their lack of experience of public roads puts them at increased risk. As children grow older they acquire more freedom and can be influenced by social situations. With freedom comes increased mobility, and new skills must be learned if children are to remain safe on the road. Research commissioned by Road Safety Scotland in 2007 established that child casualties on the way to and from school peak at around age 12 with 30% more children killed or seriously injured in the first two years of secondary school when compared with the final two years of primary school (Scottish Government, 2008a).

The most recent survey of local authorities' school transport practice was reported in 2007 (Skellington-Orr *et al*., 2007). The report noted that legislation, guidance and practice surrounding school transport have developed incongruently leading to confusion around some aspects of school transport provision. Some local authorities have sought to overcome this by providing information to parents and schools although the report found that other local authorities did not have any clear guidance regarding school transport provision.

The 2007 survey of good practice concluded that, in general, authorities were performing well with regard to the provision of school transport; however there remained room for improvement with regard to pupil safety. The survey established that more local authorities were concerned with pupil behaviour than road safety, although road safety was the second most reported safety concern. Skellington-Orr *et al*. (2007) did not focus on school transport safety per se and there is no assessment of risk by travel mode. To build on this work a focus on school transport safety is required with an analysis of risk to appreciate where school transport safety can be most improved.

1.2 Research rationale

Following the fatalities of two pupils returning home from school in Aberdeenshire in 2008, the local authority, Transport Scotland and SCOTS have sought to establish clear guidance to inform and promote school transport safety throughout Scotland. TRL was commissioned through Transport Scotland's Trunk Road Research Programme to develop a guide outlining current policy and good practice procedures related to school transport safety. The guide is the key output of the project and is aimed at local authorities and others with a responsibility for school transport safety, as a first point of reference. The guide includes a measure of relative risk for different transport modes, policy and guidance associated with different transport modes, and recommendations to address areas of risk and improve the safety of pupils' journeys to and from school. The outputs of the project are the guide and this report. Both of these documents outline existing legal responsibilities and guidance for authorities regarding school transport safety (i.e.

the things local authorities **should** be doing), and the key recommendations for improving school transport safety (i.e. what authorities **could** be doing) based on the work carried out.

While the guide will by design be easily accessible and highlight key points, it is considered imperative that the recommendations contained within it are informed by a scientific evidence base. TRL has therefore produced this report to detail the evidence from which the guide has been constructed. Where possible, evidence from Scotland has been the initial source of information; however, where no evidence from Scotland was available, or where it was deemed to improve the knowledge base, international evidence is presented.

1.3 Defining school transport

As there are various modes of transport used across Scotland to take pupils to and from school it is necessary to define what is considered in this report. This report considers school transport to include all main methods by which pupils travel to and from school, which include: bus, minibus, car (including taxi), cycling and walking. As school bus provision is one of the major responsibilities of local authorities, the report is weighted toward this mode of transport, although safety aspects of other major modes of travel are also discussed. Some pupils use the public bus network, however this is not considered separately in this report. The report instead focuses on dedicated school transport provision as organised by local authorities. Even so, many of the safety related issues discussed within the report can be applied and would improve the safety of pupils using the public bus network.

1.4 Scotland's Road Safety Framework to 2020

Scotland's Road Safety Framework to 2020 outlines Scotland's road safety targets and priority areas (Scottish Government, 2009). Reducing child causalities is defined as one of the priority areas; hence seeking to improve school travel safety is aligned with the framework. The Scottish Government aims to reduce the number of children (aged <16) killed on Scotland's roads by 50% and those seriously injured by 65% by 2020.

The Scottish Government is also committed to encouraging active travel to and from school that will reduce car use and dependency. At peak times in the morning and afternoon, one in five of the cars on the road is on the 'school run'. A reduction in car use can improve the health and well-being of children and young people, reduce congestion, and decrease CO2 emissions. However, in order for active travel to be a viable alternative to the car, there must be safe routes to school. Each school is geographically unique and School Travel Plans have been established for many schools under the Safer Routes to School initiative. This initiative is supported by School Travel Co-ordinators at some local authorities.

The promotion of walking and cycling to and from school is also compatible with both the Schools (Health Promotion and Nutrition) (Scotland) Act 2007 and the Health and Wellbeing outcomes in A Curriculum for Excellence (LTS, 2010).

The current report explores the effect of 'school run' modal shift towards active travel on child casualty risk in Scotland. This analysis is important if we are to understand the safety improvements required for Scotland to achieve the targets set for 2020, should there be significant shift between modes, which differ in terms of risk.

1.5 Limitations

The report has focused on the safety considerations of the main modes of transport by which pupils in Scotland get to and from school. It is acknowledged that there will be pupils and authority areas with varied modes of transport that are not covered here. It is

expected that in these cases authorities will have assessed the safety of pupils in such circumstances and are aware of their responsibilities.

The report discusses transport to local authority schools and not independent schools although the safety aspects of school travel are often generic and will apply to independent school transport also. In addition, there may be specific safety issues that relate to the transportation of children with special needs which are not covered here. Again it is expected that in such circumstances local authority school transport provision is organised with the safety of the pupil in mind.

There is generally a dearth of scientific studies of school transport safety that obstructs our understanding of the key mechanisms that produce the desired safety outcome (i.e. casualty reductions). The report exercises the use of expertise in other domains to complement existing school transport literature to provide recommendations based on scientific research. Nevertheless the lack of distinct literature regarding the safety of school transport in the UK limits any work that seeks to produce guidance of best practice.

2 Methodology

TRL proposed a desk-based research project with stakeholder consultation. The purpose of this methodology was to bring together analysis of casualty data, existing policy, relevant literature, and good practice in relation to school transport safety.

2.1 Accident data review and risk analysis

A risk analysis of Scottish casualty data was carried out for the main transport modes used by pupils when travelling to and from school. Risk was measured in terms of the relative and absolute risk of being killed or injured on a journey to or from school by different travel modes. The latest data of school travel mode from a variety of sources were used in the analysis along with the most recent casualty data available. The analysis explores the risk by travel mode, and the risks faced by different groups (e.g. urban v rural, level of deprivation). In addition, the analysis explores the effect of defined levels of modal shift on casualty figures so that school transport safety can be put into context with Scotland's Road Safety 2020 targets. This analysis is reported in Section 3.

2.2 Existing policy and guidance

The Scottish Executive's survey of good practice (Skellington-Orr *et al*., 2007) noted that legislation, guidance and practice have developed through a number of routes causing some confusion and inconsistency. A summary of existing policy and guidance was therefore collated to include information relevant to school transport safety. Policy on these matters has traditionally been disseminated to local authorities in the form of guidance circulars, the latest of which was made available to TRL by the Scottish Government.

Local authorities have a common law requirement for ensuring pupil safety on the way to and from school with more prescriptive laws associated with the provision of school transport. To reflect the varied challenges faced by different authority areas, policy is supplemented with recommendations and guidance. The summary of existing policy and guidance is reported in Section 4.

2.3 Survey of local authorities

To supplement the policy and guidance summary, a survey of local authorities was undertaken to establish their knowledge of current policy and whether or not they had constructed their own policy based on the recommendations and guidance previously received from the Scottish Government. A survey questionnaire for use with local authorities was constructed by TRL and can be seen in Appendix B. In addition to establishing local authorities' knowledge of policy and guidance, another purpose of the survey was to establish who local authorities saw as being primarily responsible for the safety of pupils when travelling to school (e.g. themselves, parents, schools, or school transport operators) and what areas of school transport authorities feel are their responsibility. The survey also sought to establish any schemes, trials or evaluations of school transport safety performed in the last 3 years (since the 2007 survey of good practice). The survey was distributed via email communication to all local authorities from a contact list provided by the Scottish Government. Authorities could respond online, or by email, telephone or post. Paper copies of the questionnaire were also distributed at an Education Transport ATCO Executive meeting. Detailed results and discussion of the survey is reported in Section 5.

2.4 Literature review

A literature review was carried out to explore the topic and provide a scientific basis to support recommendations to improve school transport safety. Aberdeenshire Council had already experienced difficulty sourcing literature in this area and subsequent searches identified very few high quality scientific articles relating to the topic directly. Much of the information related to school transport safety is in the form of grey literature (i.e. literature not published through conventional channels). To supplement the research previously reported in Scotland, an extensive internet search was undertaken along with a key-word search through the TRL Library and Knowledge Base system.

The TRL Library has collections of published materials spanning the last 60 years in the form of books, periodicals, conference proceedings, standards, statistics, guidance notes and several thousand TRL Research Reports. The TRL Knowledge Base comprises a number of databases, including the Transport Research Abstracting and Cataloguing System (TRACS). This is the main catalogue of transport research publications held both in the TRL library and elsewhere. It contains bibliographic references and abstracts of English and foreign language articles from journals, books and research reports. It is the English language version of the worldwide ITRD (International Transport Research Documentation database) and contains abstracts from publications in the USA, Australia, Scandinavia, the Netherlands and Canada, in addition to UK material. The database has been updated daily since 1972 and comprises over 260,000 items. A review of the literature found is reported in Section 6.

2.5 Recommendations for improving school transport safety

Based on the information discussed within previous sections of the report, recommendations to address school transport safety risks are presented. The recommendations aim to promote a consistent approach to identified areas of increased risk on the school journey and how these can be targeted. These recommendations provide the basis for the guide 'A Guide to Improving School Transport Safety'. The ten recommendations to improve school transport safety can be found in Section 7.

3 Accident data review and risk analysis

3.1 Introduction

Scotland's Road Safety Framework to 2020 (Scottish Government, 2009) sets out the strategy for casualty reduction in Scotland over the next ten years. Scotland's road safety vision is that there will be:

> "A steady reduction in the numbers of those killed and those seriously injured, with the ultimate vision of a future where no-one is killed on Scotland's roads, and the injury rate is much reduced." (Page 5)

The document also contains 2020 casualty reduction targets, (based on the 2004 – 2008 average) with milestones at 2015, shown below.

Table 3-1: Scottish road safety targets to 2020, with milestones at 2015 (reproduced from *Scotland's Road Safety Framework to 2020* (Scottish Government, 2009))

Target	2015 milestone % reduction	2020 target % reduction
People killed	30	40
People seriously injured	43	55
Children (aged <16) killed	35	50
Children (aged <16) seriously injured	50	65

This includes two targets for child casualties: a 50% reduction in fatalities and a 65% reduction in children sustaining serious injuries.

Reported Road casualties Scotland 2008 (2009) shows that there were on average, between 2004 and 2008, 60 child KSI casualties who were school pupils on a journey to or from school. This represents 18% (or more than 1 in 6) of all child KSI casualties. This is likely to be under-reported (discussed further in Section 3.3).

Reducing child casualties on the school journey is therefore central to meeting the targets relating to child casualties.

As well as having a target to reduce the number of child casualties, the Scottish Government is committed to encouraging those children who are able to walk and cycle to school. Of course this may also have an impact on casualties, since walking and cycling are likely to put children under different levels of risk than other modes such as bus and car. While it is not within the scope of this report to weigh up the different health benefits and disbenefits associated with road risk and activities such as cycling and walking, it is still useful from a policy perspective to understand what changes in travel mode balance are likely to mean in terms of the overall levels of risk in school transport. In addition, by understanding both the relative risk of given modes, and absolute exposure to these levels of risk (i.e. the number of people engaging in given activities) it will be possible to understand the potential impact of different safety interventions that target different modes.

This section therefore provides analysis of the relative risk of various modes of school transport, including the risks faced by different groups of school children based on the following categories:

- Boys/girls
- Primary and secondary age groups
- Urban/rural classification

- Deprivation levels

This will help local authorities to target initiatives towards different schools or groups of children.

3.2 Exposure data

In order to investigate the overall level of risk related to different school journeys a measure of exposure is required. This is the number of journeys made by children using different modes (or the length of journeys or the time).

This section shows summary statistics for various sources of exposure data.

3.2.1 School and population data

Data from the Scottish Government (2010c) *Scottish schools, names, addresses and school rolls* (2006) showed that there were 2,767 schools across the 32 local authorities in Scotland. The number of schools in each local authority varied from fewer than 30 in Clackmannanshire and Orkney to over 200 in Highland and Glasgow City.

On average, there are about 200 days when children attend school per year (S*chool Term Dates 2010/11*, 2010). There are extended summer holidays in July and August, a break at Easter (usually in April) and the Christmas break.

Mid-year population estimates for 2009 (*General Register Office for Scotland*, 2010) show that there were 623,000 children aged between 5 and 15 in Scotland. Population data split by gender, age, urban rural classification and Scottish Index of Multiple Deprivation (SIMD) is shown in Appendix A.1.

3.2.2 Hands up survey

The 2008 National Hands–Up Survey Scotland (Sustrans, 2009) collected data about pupils' journeys to school, consisting of answers to the question 'how do you normally travel to school'. The survey was carried out in September 2008. In total the survey included almost 400,000 children (about two-thirds of all school-aged children in Scotland). Table 3-2 reproduces the national results from the survey.

Table 3-2: Travel modes by school type (2008 Hands-up Survey Scotland)

School Type	Walk	Cycle	Scooter or skate	Park & Stride	Driven	Bus	Taxi	Other	Sample
Primary Schools	51.6%	3.4%	1.0%	7.3%	25.3%	9.5%	1.6%	0.2%	260,505
Secondary Schools	42.8%	1.6%	0.2%	3.6%	12.7%	37.2%	1.0%	0.9%	129,161
Independent Schools	27.2%	1.9%	0.6%	7.1%	42.4%	18.3%	0.4%	2.0%	6,578
SEN Schools	13.5%	1.5%	0.0%	4.5%	6.8%	47.4%	26.3%	0.0%	133
All	48.3%	2.8%	0.7%	6.1%	21.5%	18.7%	1.4%	0.5%	396,377

Just over half (52%) of trips to primary schools were made on foot, with about one-quarter of pupils (25%) driven in a car. Park and stride accounted for 7% of journeys, although it is unclear how far a walk from a car would be classified as park and stride. 9.5% of trips were made by bus.

Secondary school pupils were more likely to travel by bus (37%) although a substantial number (43%) walked to school. Fewer pupils were driven to school (13%) than in primary schools (25%).

Data are also available for each age group in each local authority.

This survey records the main mode of travel to school. It is likely for car journeys and bus journeys there is also a part of the journey, for example, from home to the bus stop and from the bus stop to school, which are walked.

The hands-up survey for Scotland in 2009 (Sustrans, 2010) was not published in time for the analysis in this document. Figures for 2009 show a slight reduction in walking and a slight increase in driven trips.

3.2.3 National Travel Survey Scottish results

National Travel Survey 2007/08 – Scottish results (2010) provides data based on a sample of households recording their journeys for a period in a travel diary. Table 3-3 below shows the percentage of trips to and from school by mode.

Table 3-3: Trips to and from school by main mode Scottish residents: pupils aged 5 to 16 (*National Travel Survey 2007/08 – Scottish results* (2010))

Mode	1998 /00	2002 /03	2004 /05	2006 /07	2007 /08
Walking [1]	52%	52%	54%	47%	46%
Bus	25%	26%	20%	23%	23%
Car	21%	19%	23%	27%	27%
Bicycle	0%	0%	1%	1%	1%
Other	2%	2%	2%	2%	2%
Number of school pupils in sample (100%)	285	559	335	532	512

As with the Hands-up survey, the most common mode for school journeys is walking (46% in 2007/08). This survey shows similar levels of cycling to school.

This survey records the main mode of travel to school, however another mode may have been involved (e.g. walking to and from the bus stop or car).

3.2.4 Scottish Household Survey – Household transport

Household Transport in 2008 (Scottish Government, 2009c) presents analysis of Scottish Household Survey (SHS) data. The survey is based on a sample of Scottish households and includes some questions about school travel (made by a randomly chosen child in each household). Table 3-4 shows the results for the sample for the last five years.

[1] National Travel Survey results state "Changes to the format of the NTS Travel Diary in 2007 has resulted in the under-recording of short trips in 2007 and 2008, therefore figures should be taken with caution. Most affected are walks under 1 mile and short car trips under 5 miles. Further information is available on the Department for Transport website."

Table 3-4: Pupils in full-time education at school - usual method of travel to school (Scottish Government, 2009c)

Mode	2004	2005	2006	2007	2008
Walking	51.2%	52.5%	51.1%	52.8%	48.8%
Car or Van	21.6%	21.0%	21.7%	21.9%	23.6%
Bicycle	1.0%	0.6%	0.9%	0.8%	1.5%
Bus*	23.6%	23.6%	23.7%	21.9%	23.9%
School bus	16.9%	16.5%	17.0%	14.8%	16.5%
Service bus	6.7%	7.1%	6.7%	7.1%	7.3%
Rail	0.9%	0.7%	1.2%	0.9%	0.7%
Other	1.8%	1.6%	1.3%	1.7%	1.5%
Sample size (=100%)	3,347	3,272	3,240	2,517	2,750

Columns may not sum to 100% due to rounding

*Bus includes those who travel by private bus and works bus. Rail includes underground

This shows similar results to the other two data sources, with walking making up just less than half (49%) of school journeys in 2008, and about one-quarter for each of bus and car travel. The percentage of journeys by bicycle is recorded in all the data sources as less than 3%. Data are also published which disaggregates travel to school by the following variables (see table in Appendix A.2)

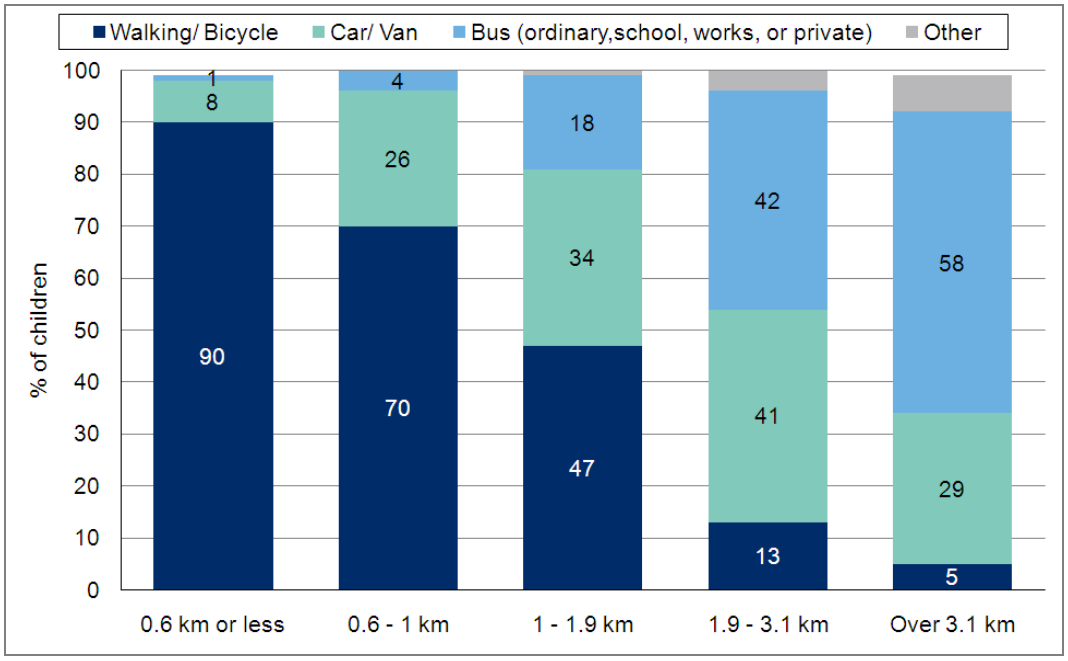
- Boys and girls
- Age groups
- Scottish Index of Multiple Deprivation (SMID) (see section 3.4.6)
- Scottish rural/urban classification

The data show that:

- Walking is the most common mode choice, across all age groups are areas.
- Walking is the most common method of travel to school for primary age groups , and pupils in this age group are more likely to walk or cycle than secondary aged pupils;
- Walking is also the most common method of travel to school for secondary age groups , and pupils in this age group are more likely than younger children to use a bus or coach;
- For all SIMD quintiles walking was the most common way of travelling to school; slightly more common for the 20% most deprived areas and the 20% least deprived areas;
- In the most deprived areas fewer pupils travelled to school by car compared with those in other areas.
- Walking was the most common way of travelling to school in urban areas and towns, in rural areas bus journeys were more common.

This survey records the main mode of travel to school, however another mode may have been involved (e.g. walking to and from the bus stop or car).

Data from the Scottish Household survey, reproduced below, shows how travel to school on foot or by bicycle decreases with increasing distance travelled, and the percentage of children travelling to school by bus increases with increasing journey distance.



Figures may not sum to 100% due to rounding

Figure 3-1: How children usually travel to school by distance between home and school (reproduced from Scottish Household Survey Results 2009)

The Scottish Household Survey Results 2009 (Scottish Government 2010) showed similar results to the 2008 data for travel to school overall, although splits as shown here are not currently available.

3.3 Casualty data

In a recent review of this national accident data system (DfT, 2010), DfT reviewed the variables collected and commented on the school journey variable[2] as follows:

> *Important variable - but analysis of the current data shows it is very poorly completed. The poor quality of the information makes it unreliable for research. School journey travel may be imputed using information about age of casualty, time of day, day of week and month. (Page 6)*

Colin Buchanan and Partners (2002) examined child accidents en route to and from school for the Scottish Executive and also noted that the coding of the school pupil casualty variable is not fully reliable.

Analysis of the Stats19 data for child casualties in accidents in Scotland between 2005 and 2009 (obtained from Transport Scotland) showed that there were a considerable

[2] Injury accidents reported to or by the police are reported using the Stats19 protocol. This includes details of the circumstances of the accident, the vehicle(s) involved and the details of any casualties.

The casualty details include whether the casualty was a pupil on a school journey. This includes children up to and including 16 years of age, including travel to pre-school playgroups. Journeys to or from school include journeys made before or after school to activities based at the school, but not journeys to activities which are not based at the school itself.

number of child casualties in accidents on weekdays during school hours or travel times that were not coded as being a school pupil casualty.

All analysis was therefore carried out on the following two subsets of data:

1. Casualties who were coded as school pupil casualties in Stats19.
2. An alternative set of criteria for school pupil casualties based on child casualties (ages <16) who were in accidents on a weekday, between 8am and 5pm in any month except for April, July and August.

The months of April, July and August were excluded from the second group since these months included a large amount of school holidays, although do include some term-time. This subset of casualties will also include casualties on weekdays during days not at school, for example, half terms, Christmas holidays, inset days, sickness or study leave; it will also include journeys carried out during the school day that are not necessarily a journey to or from the school. Extending the time period to 5pm allows for about 90 minutes of travel after school. It is likely that for pupils who attend schools near to their home will have travelled home in this time and may be taking part in other activities (for example trips after school with family or friends).

Note that these two groups are not mutually exclusive – they are simply two ways of estimating the number of casualties on school journeys and show some overlap as shown in Table 3-5.

Table 3-5: Comparison of child casualties who were 'school pupil casualties' or selected using alternative criteria (2005-2009)

Does the casualty meet the alternative criteria for school pupil casualties	Was casualty coded as school pupil casualty in Stats19?		
	Yes	No	Total
Yes	1,212	1,878	3,090
No	531	5,553	6,084
Total	1,743	7,431	9,174

This shows that almost one-fifth (19%) of all child casualties were coded as school pupils in Stats19. About one-third (33%) of all child casualties met the alternative criteria for school pupil casualties, of which about 40% were also coded as school pupil casualty in Stats19.

Those child casualties who were coded as school pupil casualties in Stats19 and meet the alternative criteria for school pupil casualties are very likely to be school pupil casualties. Those that fulfilled one or other of these categories may be school pupil casualties, and those that fulfilled neither condition are unlikely to be school pupil casualties.

Table 3-6 shows the number of casualties recorded in Stats19 by mode of travel. This is how the casualty was travelling at the time of the accident. If the casualty had just alighted from a vehicle (for example a bus or car) or was crossing the road in order to reach a bus or car, they will be coded as pedestrians.

Table 3-6: Mode of travel of school pupil casualties (2005-2009)

Road user type	Casualties coded as pupil to/from school in Stats19		Meets alternative criteria for school pupil casualties	
	Number	%	Number	%
Pedestrian	1,312	75%	1,708	55%
Pedal cycle	63	4%	193	6%
Motor cycle	2	0%	27	1%
Car	204	12%	858	28%
Taxi	9	1%	16	1%
Minibus	30	2%	31	1%
Bus/coach	118	7%	231	7%
LGV	1	0%	10	0%
HGV	0	0%	1	0%
Other	4	0%	15	0%
Total	1,743	100%	3,090	100%

Columns may not sum to 100% due to rounding

The Stats19 data also include other variables which can be used to disaggregate the casualties. There are also some calculated variables (SIMD and rural/urban) which are based on the grid reference location of the accident.

Tables of casualties by the following variables are shown in Appendix A:

- Males and females
- Age groups
- Rural/urban classification
- Scottish Index of Multiple Deprivation (Scottish Executive, 2009b)
- Time of day

The accident data showed that:

- Between 25% and 45% of child casualties were estimated to be on a school journey. The lower of these estimates is based on the school pupil casualty field recorded as part of the accident data, the upper estimate is based on alternative criteria based on child casualties at specific times;
- Comparison of the distribution of school pupil casualties by mode using the two definitions showed that 75% of child casualties coded as school pupil casualties in Stats19 were pedestrians and 12% were car occupants, compared with 55% and 28% respectively using the alternative criteria;
- There was a greater proportion of male casualties who were cyclists compared with females;
- Female casualties were more commonly passengers in cars or bus/coach compared with males;

- For both primary and secondary age groups, pedestrian casualties were the most common. Secondary school aged children were more commonly injured as pedestrians and less commonly injured as car occupants compared with primary school aged children
- In Urban areas and towns, pedestrian casualties a higher percentage of school pupil casualties were pedestrians compared with those in rural areas
- In rural areas there was a higher percentage of casualties that were car occupants or bus/coach occupants compared with those in urban areas
- Pedestrian casualties were relatively more common in the most deprived areas (32% of pedestrian casualties occurred in the 20% most deprived areas)
- Three-quarters of pedestrian and pedal cyclist casualties and two-thirds of vehicle occupant casualties occurred in the afternoon.

Table 3-7 shows the number of school pupil casualties by mode and severity between 2005 and 2009.

Table 3-7: Number of school pupil casualties by mode and severity (2005-2009)

Casualty mode	Casualties coded as pupil to/from school in Stats19				Meets alternative criteria for school pupil casualties			
	KSI	Slight	All casualties	% KSI	KSI	Slight	All casualties	% KSI
Car	19	185	204	9.3%	83	775	858	9.7%
Pedestrian	245	1,067	1,312	18.7%	336	1,372	1,708	19.7%
Pedal cycle	1	62	63	1.6%	26	167	193	13.5%
Bus/coach	3	115	118	2.5%	8	223	231	3.5%
Other	2	44	46	4.3%	16	84	100	16.0%
Total	270	1,473	1,743	15.5%	469	2,621	3,090	15.2%

Overall, about 15% of reported school pupil casualties were killed or seriously injured. Pedestrians in accidents were more likely to be killed or injured. The vast majority (97%) of injuries to bus or coach occupants were slight injuries. The percentage of casualties who were killed or seriously injured was similar using both methods for car occupants and pedestrians. However, 1.6% of cyclist casualties coded as school pupil casualties were killed or seriously injured compared with 13.5% of casualties meeting the alternative criteria. This difference may be due to different levels of risk or different levels of reporting, although the former is based on just 1 KSI, and therefore the figure is highly unreliable.

Colin Buchanan and Partners (2002) studied detailed accident records for child accidents during school hours and found that 12% of the casualties are injured when a bus is positively identified as being present as a hitting or non-hitting vehicle. It was also found that the largest group (57%) of accidents occurred in the afternoon and involved pedestrian movement shortly after alighting from a bus (78% of children). This suggests that these accidents happened at a non-school end (home or otherwise) of a trip from school.

Many of these differences may be due to different exposure levels. The next section looks at the relative risks of the different modes and factors affecting the risk.

3.4 Rates and risks

This section combines the exposure data and the casualty data from the previous sections to give the relative risks to children on their school journeys, for a given mode. The first analysis is the overall risk of using different modes. The data is then disaggregated where possible to give the risks to different groups.

3.4.1 Risk by mode per trip

The average distribution based on the three different measures of exposure (Hands Up Survey, National Travel Survey, and Scottish Household Survey) and the average casualty distribution based on the two different criteria ('coded as a school pupil casualty in Stats19' and 'alternative criteria' were used to give the risks of travel to school by different modes.

Table 3-8 gives a summary of the exposure and casualty data and the risk of each mode. The exposure measures are based on the main mode of transport for the school journey and the casualties are based on the mode at the time of the accident. This is particularly important for bus journeys, which may include a walk, and means that the bus risk is underestimated and the pedestrian risk is overestimated.

Table 3-8: Risk of school journeys by mode

	Walking	Bus	Car	Bicycle	Other	Total
% of journeys (3 source average)	49%	21%	23%	2%	5%	100%
Total journeys per year (million)	62	26	29	2.0	5.9	125
% of school pupil casualties (2005-09)	65%	7%	20%	5%	3%	100%
School pupil casualties per year (average of 2 methods)	314	34	97	24	15	483
Risk per million journeys	5.1	1.3	3.3	12.4	2.5	3.9

Notes:

Columns may not sum to 100% due to rounding

% of journeys is the average of the three different surveys as shown in Section 3.2

Total number of journeys is estimated from the exposure data in Section 3.2, mid year population estimate for ages 5-15 and assumes 200 journeys to school per year per child. A journey is a trip to school and back.

% of school pupil casualties is the average of the two measures given in Section 3.3

Car casualties does not include taxi casualties, bus casualties do not include minibus casualties. No casualty data corresponding to 'park and stride' – casualties will be coded as car occupants or pedestrians.

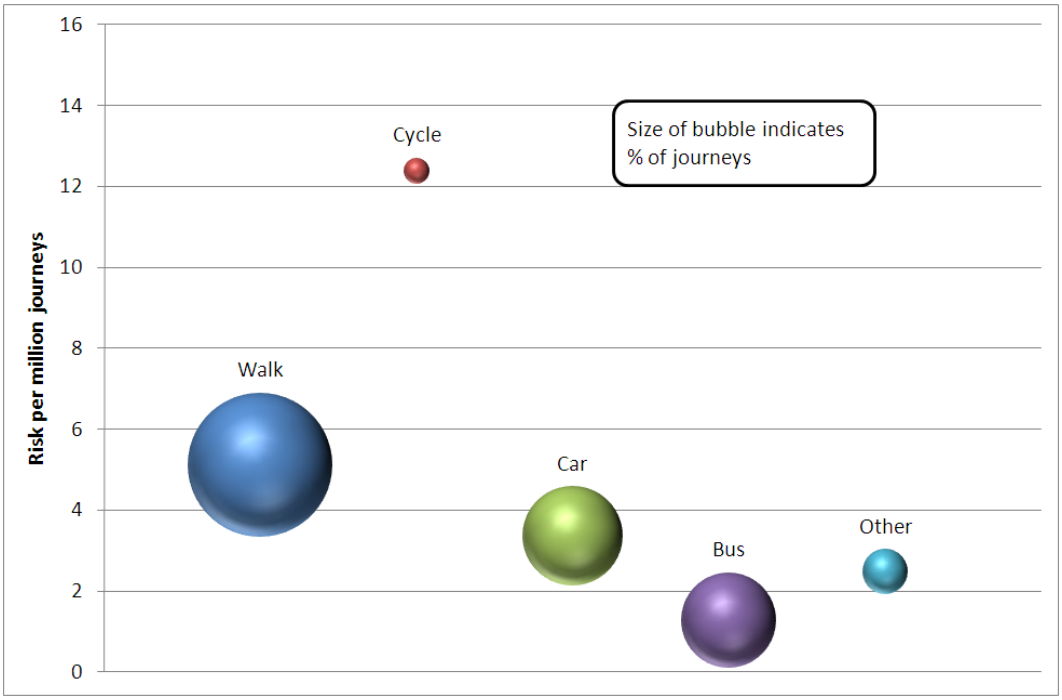
Other – for exposure data this includes train. For casualties other includes taxi, minibus, LGV, HGV and other.

This shows that cycling to and from school has the greatest risk per million journeys, almost ten times higher than travelling by bus, and more than twice as risky as walking.

It is likely that trips by bus/coach or car are longer than those walked or cycled. Thus it is likely that if distance were used as the exposure variable, it would give the risks per unit exposure for these vulnerable modes as even greater again than for car and bus.

Journeys to school by car are likely to involve a small element of walking (depending on how far from the school entrance vehicles can be parked. For buses, particularly public buses, the start and end of the journey may involve a walk. For public buses in particular, users will normally have to cross a road (the bus route) either on the way to or from school to get from their home to the bus stop or from the bus stop to their home, and similarly between the bus stop near school and the school entrance. These small walking trips are not recorded as part of the exposure data, and hence the pedestrian risk is artificially high since if a child is involved in an accident on one of these small walks he or she is classed as a pedestrian casualty.

Although these data give relative risks of each of the modes, it should be borne in mind that reducing the risk of the highest risk group may not give the greatest reduction in casualties since the number of children that use each mode is different, and that there may be some measures which are easier to implement to reduce the risk than others. About half of children walk to school and therefore improvements in pedestrian safety can show the greatest benefits overall. This is illustrated in Figure 3-2, in which the size of the 'bubbles' represents the proportion of people engaged in the mode of transport to and from school, while the position along the y-axis represents the risk. As with Table 3-8, this is based on the average of the two methods for determining the number of school pupil casualties, and the average of the exposure data where available.



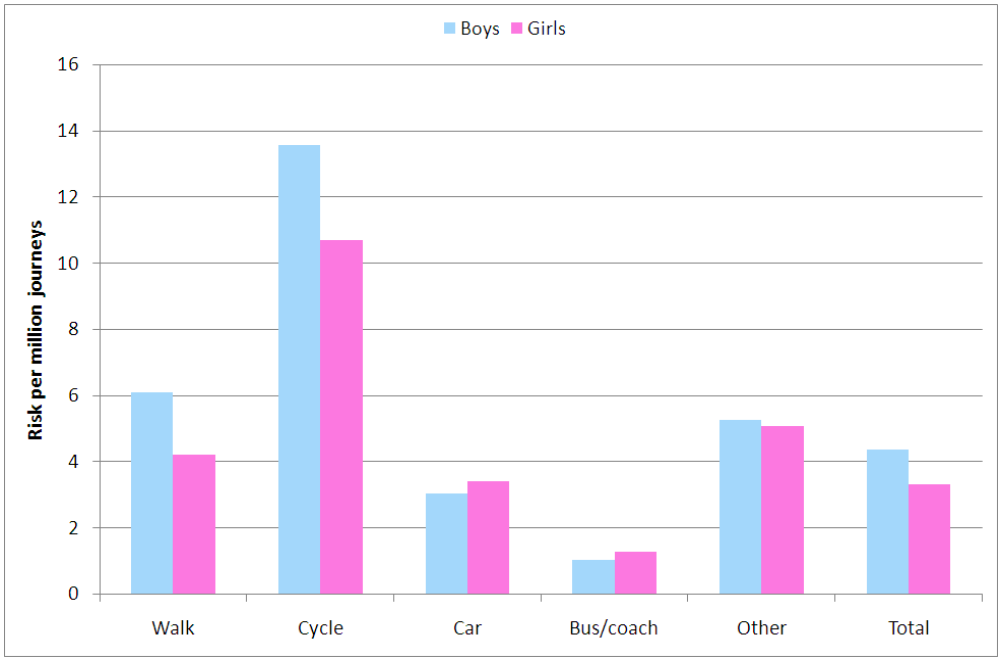
Note that due to differences in recording casualties and exposure the pedestrian risk is an overestimate and the bus risk is an underestimate

Figure 3-2: Risks and exposure levels of school journeys

3.4.2 Boys and girls

Analysis using exposure data from the Scottish Household Statistics and Stats19 accident data gave the risks of boys and girls using different modes of transport to and from school, as shown in Figure 3-3.

This suggests that the risks for walking and cycling are slightly higher for boys than girls.

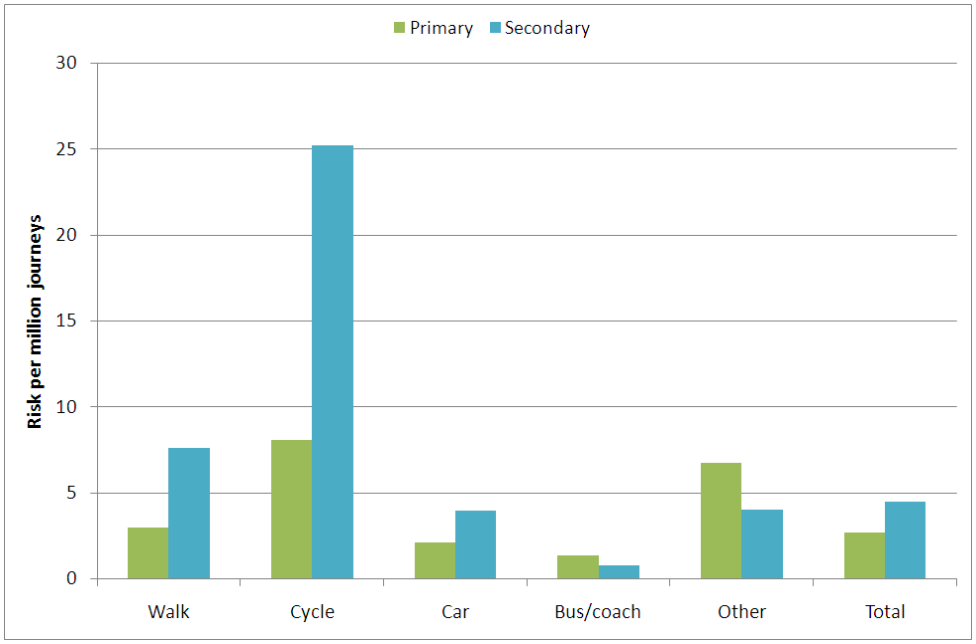


Note that due to differences in recording casualties and exposure the pedestrian risk is an overestimate and the bus risk is an underestimate

Figure 3-3: Risk on school journeys by gender

3.4.3 Age group

Analysis using exposure data from the Scottish Household Statistics and Stats19 accident data gave the risks of primary and secondary pupils using different modes of transport to and from school, as shown in Figure 3-4. The pre-school age group is not shown in chart as no exposure data were available.



Note that due to differences in recording casualties and exposure the pedestrian risk is an overestimate and the bus risk is an underestimate

Figure 3-4: Risk on school journeys by age group

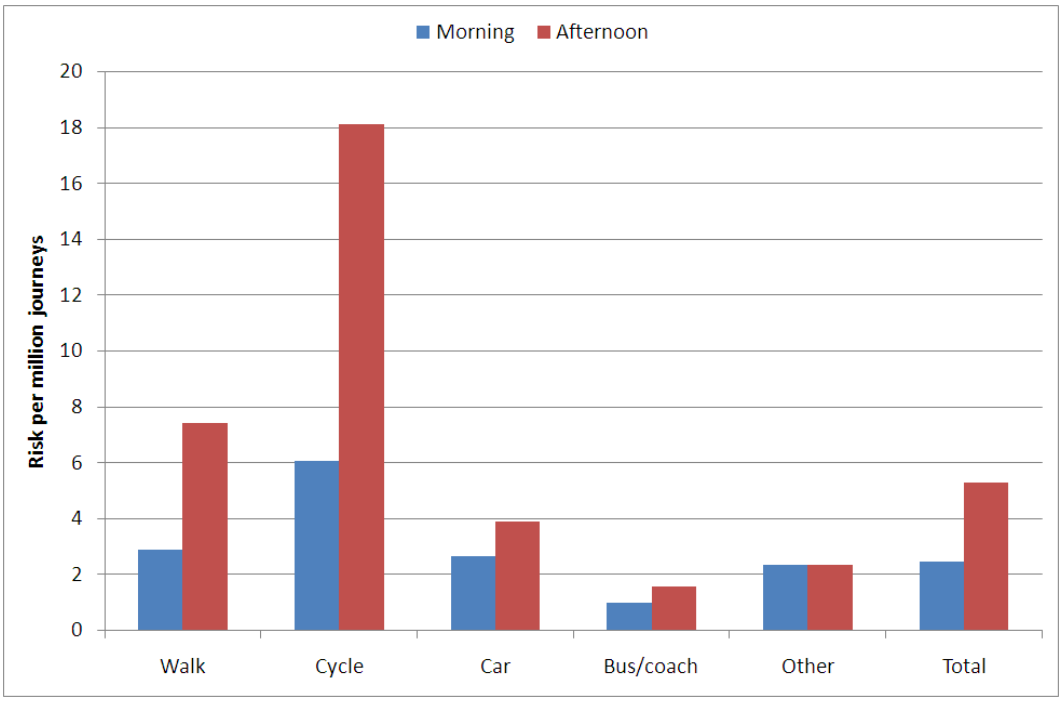
This shows an increased risk for those in the secondary age group travelling by bicycle or walking. There is also a slightly higher risk for secondary age pupils travelling by car compared with primary school pupils. These differences may be due to a possible increase in journey length for secondary school pupils and the likelihood that fewer parents will accompany their children on the journey to secondary school.

Although the risk to pedal cyclists is highest, it is likely that a reduction in the risk to pedestrians (especially the secondary age group) would have the greatest casualty benefit overall.

3.4.4 Journeys to and from school

No data were available on exposure data for to and from school separately. The following data are therefore based on these assumptions:

- Trips to and from school have the same distribution by road user type.
- All casualties in accidents in the morning trips were as part of a journey to school and all afternoon/evening trips are journeys from school.



Note that due to differences in recording casualties and exposure the pedestrian risk is an overestimate and the bus risk is an underestimate

Figure 3-5: Risk on school journeys to and from school

This shows an increased risk for walking and cycling home from school compared with journeys to school.

3.4.5 Rural/urban

The *Scottish Government* (2008) urban rural classification provides data on areas of Scotland using a six-fold classification. This defines settlements of 3,000 or fewer people to be rural. It also classifies areas as remote based on drive times from settlements of 10,000 or more people. Figure 3-6 shows a map of the classification.

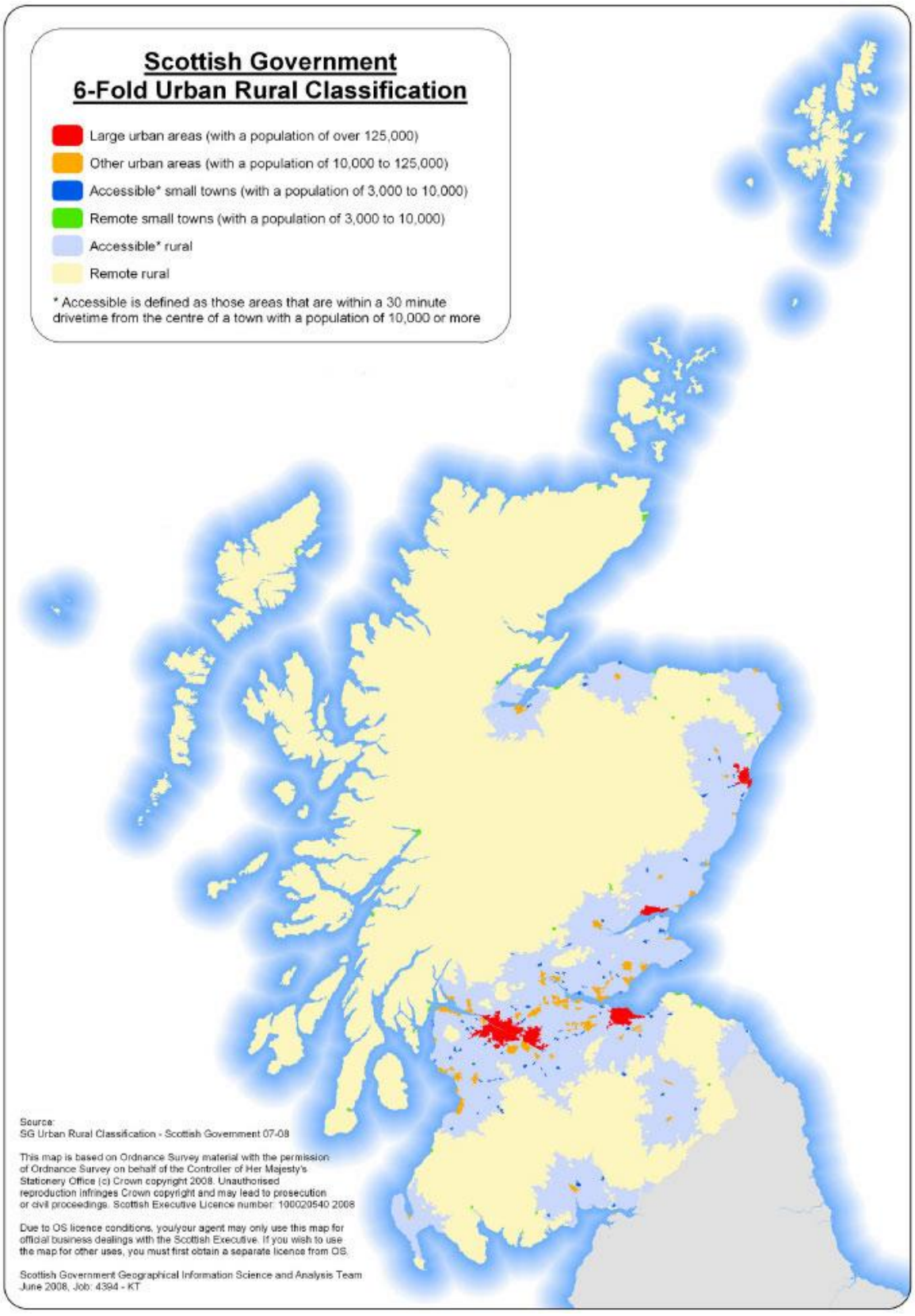
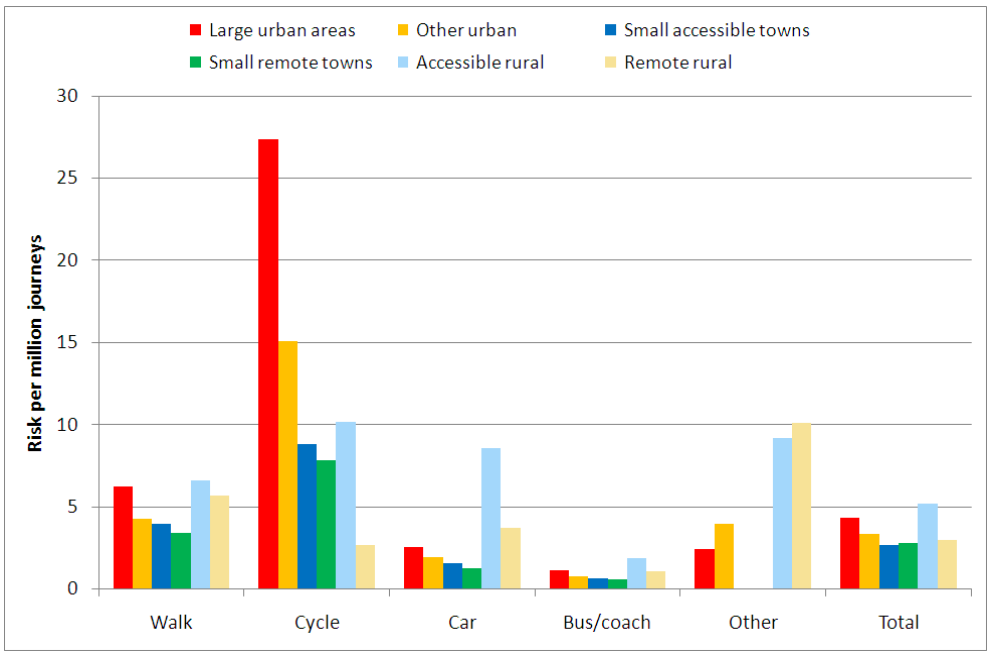


Figure 3-6: Scottish Government 6-fold Urban Rural Classification (Reproduced from *Scottish Government*, 2008)

The Scottish Household Statistics include the distribution of school trips by this 6-fold urban rural classification. This classification was also added to each casualty record based on the location of the accident. This gives the risks as shown in Figure 3-7 below.



Note that due to differences in recording casualties and exposure the pedestrian risk is an overestimate and the bus risk is an underestimate

Figure 3-7: Risk on school journeys by urban rural classification

For most of the six urban rural classifications, cycling is the most risky per trip (apart from remote rural where 'other' has the highest risk). Cycling generally increases in riskiness as the area becomes more accessible or urban, although the percentage of journeys made by bicycle remains low (see Table A.2).

Bus or coach journeys are the least risky in all areas (note this does not include any pedestrian casualties which may be associated with a bus or coach).

In rural areas, both accessible and remote, walking has a slightly higher risk than in most of the other areas. In these remote areas the risk for car passengers is also greater than in the other classifications. These differences may be due to the nature of the roads in these locations, and also the fact that these journeys are likely to be longer.

About 41% of school pupil casualties occurred in large urban areas, and over half of pupils in large urban areas walk to school. A reduction of the risk in these areas is therefore most likely to provide the greatest benefit in risk overall.

3.4.6 Deprivation

The *Scottish Government* (2009b) Scottish Index of Multiple deprivation (SIMD) indicates the deprivation level of areas. The index covers the following domains, each made up of individual indicators:

- Income
- Employment
- Health
- Education, Skills and Training
- Access to Services

- Housing
- Crime

Figure 3-8 shows a map of the SIMD.

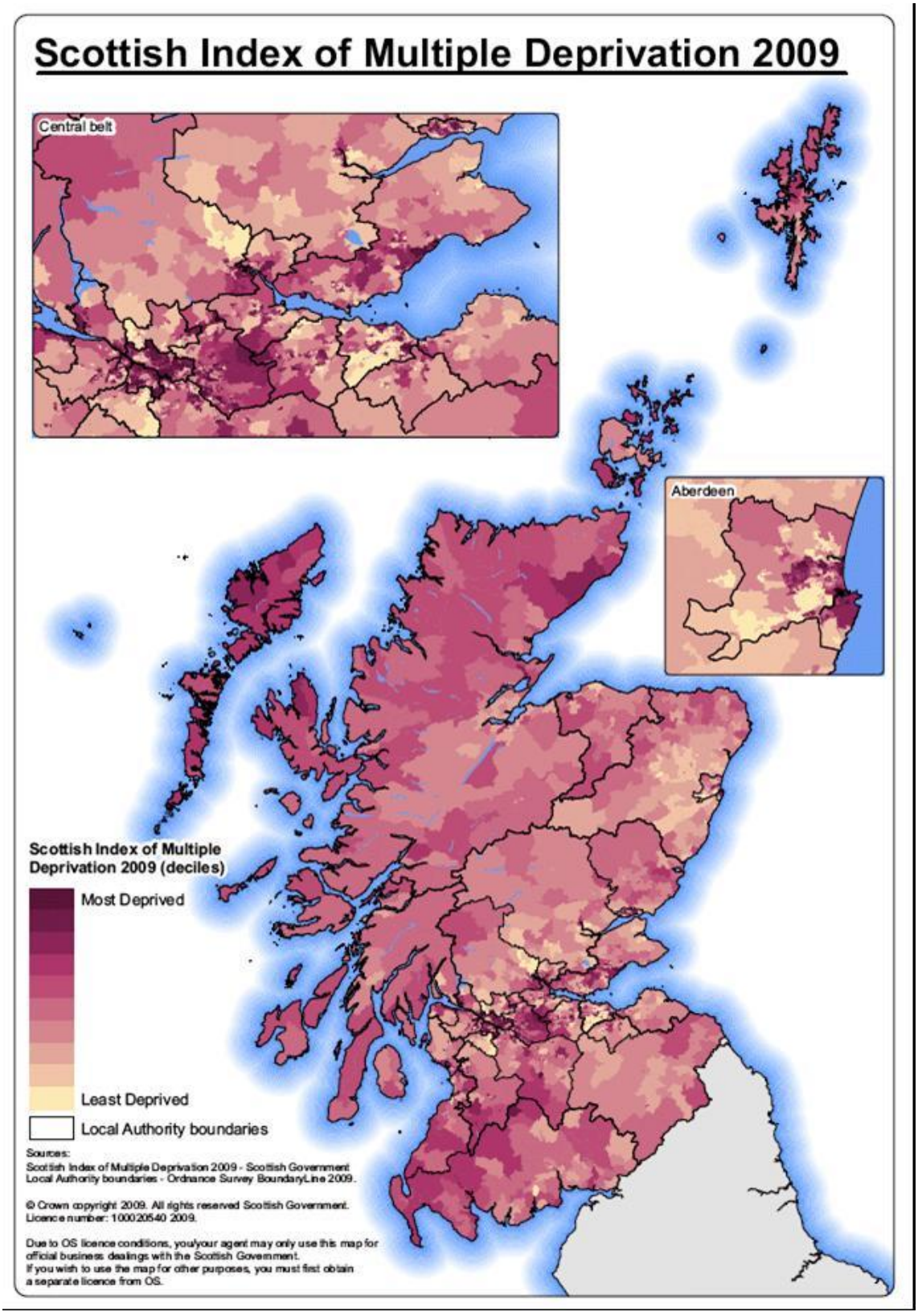
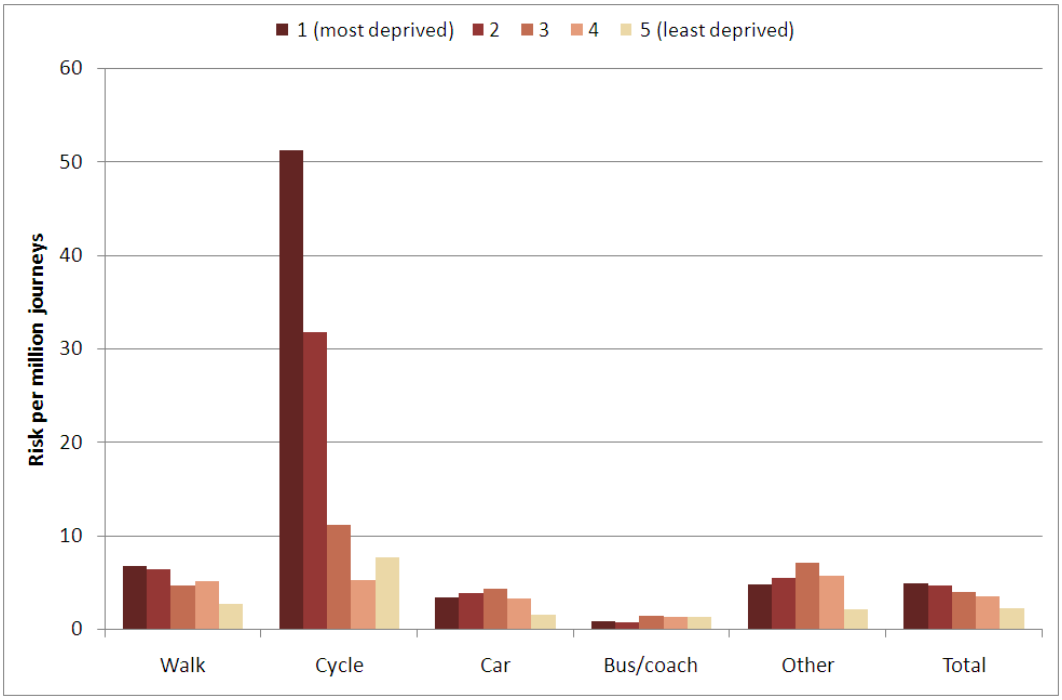


Figure 3-8: Scottish Index of Multiple Deprivation 2009 (Reproduced from *Scottish Government* (2009b))

Ninety-two percent of the most deprived ('top 15%' in deprivation) areas are urban areas.

Scotland is divided into 6,505 'datazones', with a median population of 769, for which the SIMD is calculated. The location of the accident recorded in Stats19 is used to determine in which datazone the accident occurred and hence determine the SIMD for casualties in accidents. The risk shown below in Figure 3-9 is based on the Scottish Household Survey exposure data.



Note that due to differences in recording casualties and exposure the pedestrian risk is an overestimate and the bus risk is an underestimate

Figure 3-9: Risk by SIMD and road user group

As with the other risks, although cycling is the highest risk in almost all areas, maximum overall benefit may be obtained though initiatives to reduce the risk of walking, especially in the more deprived areas, due to the overall numbers of people engaged in walking compared to cycling.

3.5 Scenarios

The previous section has shown the risk of each of the modes based on the current casualty and exposure levels. However, if the exposure were to change, the prioritisation between risk reducing measures for the modes may also change.

The interplay between the relative risks and the number of people using each dictates the possible change in casualties depending on how much safer each mode can be made.

The risks and exposure to different modes can be used to estimate any changes in casualties either from a change in the risk level or from a change in exposure levels.

Table 3-9 shows the estimated reduction in casualties that might result from a reduction in the risk level by 10%. Since almost half of all children walk to school, a reduction in the risk to pedestrians is estimated to give the greatest benefit.

Table 3-9: Estimated casualties saved by reducing risk of each mode by 10%

Mode	Current risk	Current % of children using mode	Reduction in risk	Potential reduction in casualties per year
Walking	5.1	49%	10%	31
Cycling	12.4	1.6%	10%	2
Bus	1.3	21%	10%	3
Car	3.3	23%	10%	10

Two scenarios are shown below for changes to the exposure levels, encouraging fewer children to come to school by car, and the resulting estimated casualty numbers.

Scenario 1:

> Encourage 30% of pupils currently driven to school to travel on foot, by bicycle or bus, assuming equal number of pupils change to each of the three alternative modes (that is, 10% to each).

Scenario 2:

> Encourage 30% of pupils currently driven to school to travel on foot, by bicycle or bus, assuming that pupils change to alternative modes in the same ratio as existing users of those modes (that is, the number of pupils travelling by each of the alternative modes increases by the same percentage)

In both scenarios, assuming that the risk levels stay the same for each given mode, the reduced number of pupils travelling to school by car gives an estimated reduction in the number of car casualties. However, since the risk of travelling by bicycle and on foot is higher than the risk for car occupants, and the bus risk is lower, there would be an estimated increase in the overall number of casualties. The estimated annual numbers of casualties are illustrated in Figure 3-10.

Figure 3-10: Estimated annual number of casualties by mode for two scenarios

These scenarios assume that any changes in mode choice do not affect the risk levels and are used to illustrate the point that exposure to risk is itself an important factor to consider in any road safety context.

In practice the link between exposure and risk is likely to be more complex than has been assumed in this illustrative example. For example:

- Fewer pupils travelling by car may mean fewer cars on the road to be involved in accidents with other modes, or may mean that there is less congestion and higher speeds on the roads
- Pupils encouraged to cycle who are inexperienced cyclists may increase the cycle risk

In addition there is an argument that for cycling and walking 'safety in numbers' may apply. A number of studies suggest that the risks faced by pedestrians and cyclists can be non-linear; as the number of pedestrians or cyclists increases, the risk faced by each pedestrian or cyclist goes down, and under some circumstances with very large modal shift patterns away from cars to sustainable modes, it can be predicted that the total number of crashes will actually decrease (Elvik, 2009). Elvik (2009) discusses this issue in detail, and concludes that there are a number of ways in which the safety in numbers effect can be undermined. For example, it is possible that it only applies to reported cycling accidents (which tend to be those associated with higher injury severities and involving other vehicles), rather than the less-often reported single vehicle cycling accidents that are believed to make up the majority of incidents. One also needs to consider the proposed mechanism by which the safety in numbers effect might work; one suggestion is that very large increases in the numbers of pedestrians or cyclists are able to 'dominate' a road space such that car drivers are forced to slow down and take a secondary role in sharing that road space. This mechanism may not apply in all situations in the school transport context. For example, if children are alighting from a school bus on the journey home, increased numbers of children at each local stop may still not be sufficient to bring such a mechanism into play. It is also worth considering that the levels of modal shift that predicts safety benefits in Elvik (2009) are extremely large – a 50% reduction in car traffic and corresponding increases in pedestrian and cycling volume. Even if such changes can lead to a 'safety in numbers' effect, it would take a very long time to observe such changes in practice, and it is likely that there would be a period of time during which smaller increases in those walking and cycling would lead to increases in total risk.

Therefore it is the recommendation in this report that meaningful changes in the numbers of pupils being moved from safer modes (bus, car) to riskier modes (walking, cycling) should be encouraged only under circumstances in which very large increases in the safety of those modes are made, for example through measures such as speed reduction around schools and on routes to school.

3.5.1 Summary

This section has attempted to illustrate the importance of taking into account not only the relative risks associated with each mode, but also the total exposure to that risk across the population. The hypothetical scenarios presented illustrate how environmental or health objectives such as encouraging children to walk or cycle to school may have consequences for safety. As well as having a higher overall risk, casualties from these modes also have higher severity injuries than car occupants. Measures to reduce the risk for cyclists or pedestrians should be prioritised in the school transport context if these modes are encouraged.

Where the risk has been disaggregated in the previous section, this could also be used to investigate scenarios in terms of which measures may have the maximum benefit or how exposure levels may influence casualty levels of different groups.

3.6 Other sources of data

Stats 19 statistics do not cover enough detail to establish an in-depth understanding of the circumstances that are frequently involved in school bus related accidents. A 2002 report for the Scottish Road Safety Campaign (now Road Safety Scotland) sought to explore school bus related accidents by coding accident descriptions from a two year period (1999–2000) (Colin Buchanan and Partners, 2002). The study found that:

- 57% of accidents occurred in the afternoon and involved pedestrian movement shortly after alighting from a bus;
- 51% of casualties involved the child crossing the road in front of the bus;
- 87% of accidents occurred at locations which had no controlled crossing facilities or helpers within 50 metres;
- children aged 11–14 are most vulnerable, particularly boys;
- at least 22% of casualties were associated with school contract buses (a lack of detail in the descriptions meant this figure was considered to be a minimum); and
- most children were reportedly running at the time of the accident.

The results from this 2002 study are supported by international school-bus-related accident data from Australia and New Zealand. While it is necessary to remain cautious when drawing conclusions from cross cultural studies, New Zealand and Australian school bus provision is similar to Scotland where locally operated buses are generally contracted to provide a school bus service; this differs from the USA and Canada where dedicated yellow bus fleets are utilised for school transport. In Australia, a review of 28 school-bus-related collisions over a five year period established that 22 of these occurred as pedestrian accidents after alighting from a bus; one occurred as a pedestrian when seeking to board a bus; and five occurred as a bus passenger (Newman, 2002). These results are akin to those reported in the Scottish study where the most common fatal incident involved a pupil alighting from a bus, in the afternoon, on the way home from school. Further analysis of Australian data revealed that the risk of death or injury to children whilst in a motor car was seven times greater than the risk when travelling on a school bus. Despite this, 80% of Australian parents surveyed believed that taking their children to school by car was the safest mode of transport. Furthermore, the risk of injury whilst walking to school was found to be 31 times greater than the risk when travelling by bus, while children cycling to school were reported to be 228 times more at risk of serious injury or death than when travelling by bus (Austroads, 2002).

Similar results are reported in a New Zealand study of 112 school-bus-related accidents over a nine year period (LTSA, 2002). Seventy-five percent of fatalities and serious injuries occurred as pedestrians around a school bus, with the majority (75% of fatalities and 85% of serious injuries) occurring in the afternoon. The report from New Zealand also found that three-quarters of fatalities occurred on fast roads with a 100km/h (62 mph) speed limit.

The New Zealand study further identifies the risk associated with crossing in front of or behind a bus, and whether traffic is approaching from the same or the opposite direction to the bus. The analysis of pedestrian-related school bus incidents demonstrated that:

- Children are more likely to be hit by a vehicle travelling in the same direction as the bus;
- Children crossing in front of a bus are more likely to be hit by a motorist travelling on the same side of the road as the bus;
- Children crossing from behind a bus are more likely to be hit by a motorist travelling in the opposite direction to a bus.

These results suggest that collisions occur in situations where the school bus obstructs other motorists from visually identifying that a child is intending to cross the road, which results in the driver having little time to react when the child comes into view.

A recent report by Road Safety Analysis (2010) ranked the risk for all child casualties by population of each local authority or district. The analysis was based on 2004–08 data for all child casualties (not just school journeys) and showed that on average 1 in 427 children in the UK population are injured annually in road accidents. Ten Scottish local authority areas (out of 32) had a risk higher than the average with the highest ranked Scottish authority being Dundee City, ranked 54 (out of 407) with a risk of one child in 328. Shetland was the third lowest risk in GB, with a risk of less than one in a thousand. Analysis by MOSAIC group showed that groups D (Close-knit, inner city and manufacturing town communities), G (Low income families living in estate based social housing) and H (Upwardly mobile families living in homes bought from social landlords) were overrepresented as child casualties in Great Britain.

3.7 Summary of risk analysis

The main findings of the risk analysis are as follows:

- About half of school pupils walk to/from school;
- Cycling has the highest risk per journey, although cycling accounted for less than 3% of journeys;
- Risk per journey is higher for the following groups:
    - Boys;
    - Secondary school pupils;
    - Journeys home from school;
    - Large urban areas;
    - Accessible and remote rural areas;
    - Deprived areas.

Risk has been calculated per journey. Risks per mile would be likely to give a greater relative risk for pedestrians and cyclists as these journeys are often shorter. Pedestrian risk includes pedestrian casualties who were previously or about to be vehicle occupants, but this is not included in the exposure measure, resulting in pedestrian risks that are over-estimated and bus risks that are underestimated. The risk of travelling by bus shown here is small which is partly due to the number of bus occupant casualties being small, as well as not including those pupils injured on walking journeys between home and bus or bus and school.

Although the risk is highest for pedal cycle journeys, relatively few journeys are made by bicycle. With existing exposure levels, maximum benefit would probably be achieved by reducing walking risk, since about half of children walk to school.

If there were efforts to change mode choice for pupils' school journeys (e.g. from car journeys to walking or cycling), then care should be taken to mitigate for any increase in overall risk.

4 Existing policy and guidance

The responsibility for pupils' safety when travelling to and from school can be attributed to several parties, for example parents, local authorities, bus operators and schools. The distinction of who is responsible for particular elements of a journey can be difficult to discern and is an important consideration. This section details some of the duties and responsibilities which will be borne by different parties including parents, local authorities and transport operators. It is important that local authorities are aware of the duties and responsibilities of all parties as these matters impact on the duties and expectations of the authorities.

4.1 Duties of parents

4.1.1 Parents' responsibilities

Section 30 of the Education (Scotland) Act 1980 places a duty on parents to provide suitable education for their child either by sending him/her to a public school or by other means. For the majority of parents this involves sending their child to a school managed by their local authority and will be identified as the nearest appropriate school by the local authority.

Parents are responsible for their child's journey to and from school, or where the local authority is providing dedicated transport, between home and the pick-up and drop-off point. Parents are responsible for making arrangements for safe travel to and from pick-up and drop-off points, although it is expected that local authorities have carried out appropriate checks to ensure that these points are safe and accessible.

Many parents are unclear about the division of responsibility and local authorities are expected to provide parents with a clear indication of what their responsibilities are and what the authority perceives the division of responsibility to be within their area.

4.2 Duties and powers of Education Authorities

4.2.1 School attendance and walking distances

According to Section 42 of the Education (Scotland) Act 1980, parents have a reasonable excuse for keeping their child from school if they live more than the statutory walking distance from their designated school and no transport has been provided. The distance from the school is measured as the nearest available route. The statutory walking distance is two miles for children less than 8 years old and three miles for children aged 8 or over. **Local authorities therefore need to consider statutory walking distances when making arrangements for the provision of school transport.**

Section 51 of the Education (Scotland) Act 1980 requires education authorities to make such arrangements *as they consider necessary* for school pupils residing, and attending schools, in their area. This can include:

- the provision of free school transport for some or all of the journey;
- making bicycles or other suitable means of transport available to pupils;
- paying some or all of the travelling costs; or
- any combination of these.

When making arrangements for the provision of school transport, authorities are required to have regard for the safety of the pupil.

Authorities have a common law duty of care for the safety of pupils under their charge and this duty extends to pupils travelling on dedicated transport arranged by the authority. A duty of care is a legal obligation imposed on an individual or organisation requiring that they adhere to a standard of reasonable care while being responsible for situations that could cause foreseeable harm to others.

A duty of care for pupils' safety is also covered by the Schools (Safety and Supervision of Pupils) (Scotland) Regulations 1990. The Regulations place upon local authorities a general duty, without prejudice to any other statute, to secure, as far as is practicable, the safety of pupils when under their charge. **Pupils travelling on dedicated school transport arranged by education authorities are under the charge of the authorities, therefore authorities are expected to keep school transport provision under review to ensure the safety of pupils when travelling on school transport.**

Section 51 of the Education (Scotland) Act 1980 does not prescribe distances beyond and below which authorities must provide transport. It is expected that authorities will make free transport available to those who live beyond the statutory walking distances and are attending a school that the authority has deemed is the nearest appropriate school. Local authorities are expected to consider a combination of factors when determining the eligibility of free school transport, of which distance is only one.

Authorities must consider the safety of walking and cycling routes to school for pupils living within statutory walking distances from their designated school. If the routes could be considered unsafe, then transport should be provided, even when distances may fall short of eligibility criteria. Authorities are therefore expected to review the eligibility criteria and have flexibility to consider safety factors such as volume and speed of traffic, availability of safe crossings, sufficiency of pavements, footpaths and subways, built-up and wooded areas and street lighting. Authorities are also expected to consider medical conditions of pupils which may affect their travel to school, and also the medical condition of parents where they may be expected to accompany their child for part or all of the journey.

Authorities are not required to provide a door-to-door service and can reasonably expect pupils to access an arranged pick-up or drop-off point, provided that this point is within the statutory walking distances. As noted earlier, while parents are responsible for their child's safety to and from the pick-up/drop-off point, local authorities are expected to ensure that these points are safe and accessible.

4.3 Bus safety and standards

Legislation on bus safety standards, including seat belts is reserved to the UK Parliament.

All post-October 2001 minibuses and coaches must be fitted with seat belts. For the purposes of regulation, a minibus is defined as a motor vehicle constructed or adapted to carry more than 8, but not more than 16, seated passengers in addition to the driver; a coach is defined as a vehicle built or adapted to carry more than 16 seated passengers in addition to the driver and having a gross weight of more than 7.5 tonnes and a maximum speed of 60 mph. Minibuses and coaches built prior to October 2001 used to transport school children must have seat belts installed. For legislation, a seat belt is defined as a minimum of a lap belt. Only forward facing seats fitted with seat belts can be used for carrying school children; rearward or side-facing seats cannot be used by pupils for school travel, even if fitted with a seat belt. These requirements do not apply to urban/public transport buses. A guide to seat belt requirements, including relevant legislation, is available on the Department for Transport website: http://www.dft.gov.uk/pgr/roads/vehicles/vssafety/minibusandcoachseatbelts

All passengers in minibuses must wear a seat belt. The driver is responsible for ensuring that passengers aged 3 to 13 wear a seat belt. In other buses and coaches, passengers aged 14 years or over are required to wear a seat belt where they are fitted. EC Directive 2003/20/EC requires the law to be applied to child passengers from the age of 3 years, not 14 years, but as it was not clear how this could be implemented, the law in the UK was restricted to passengers from the age of 14 years.

Vehicle operators must now notify passengers that seat belt wearing is compulsory. This can be done by an official announcement, or an audio-visual presentation, made by the driver, conductor, courier or group leader when the passenger joins the bus or by a sign prominently displayed at each passenger seat equipped with a seat belt. Pictorial symbols must be in the agreed form showing a white figure on a blue background (see Figure 4-1). No size has been specified. (See the letter from the Department for Transport to operators dated 11/08/06 for more information: http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/consultations/archive/2004/consbc/letteraboutseatbeltwearingin1241)

Figure 4-1: Standardised sign that should be prominently displayed at each passenger seat equipped with a seat belt

Local authorities should satisfy themselves that vehicle operators comply with statutory requirements.

4.4 School bus signage and hazard warning lights

Minibuses, buses and coaches used to transport school children are required to display the retro-reflective yellow school bus sign at the front and the rear of the vehicle (see Figure 4-2 for an example of the sign). The signs must be plainly visible to road users and must not be obstructed; signs should not be placed behind vehicle windows. Vehicles showing the signs are permitted to use hazard warning lights when the vehicle is stationary and children are boarding or alighting, although they are not obliged to do so. Bus owners are also permitted to install an additional set of hazard lights to increase visibility. Additional warning signs are also allowed, for example an illuminated sign reading "Caution: School Children" could be erected on the front or the rear of the vehicle. However, there are guidelines requiring that such signs are static (i.e. not flashing) and illuminated red if erected on the rear of the vehicle, or white or yellow if erected on the front of the vehicle. Local authorities seeking to erect additional signage on their vehicles should check with the DfT or the Road Vehicles Lighting (Amendment) Regulations 1994.

While there is no statutory obligation for operators to remove the signs from vehicles when not being used to transport school children, local authorities are encouraged to make it a requirement for operators to do so. The signs must meet minimum size regulations (not less than 250 x 250 mm at the front and with a black border not less than 20 mm wide; and not less than 400 mm x 400 mm at the rear with a black border not less than 30 mm); although there is no maximum size. Authorities could therefore stipulate that a larger sign is used on school transport in their area.

Figure 4-2: Universal school bus sign that must be shown by buses carrying school children

4.5 Pupil safety when travelling to school

Pupil behaviour whilst travelling to and from school has the potential to impact on safety. **Parents, children, schools and local authorities all have responsibility for encouraging pupils to behave responsibly whilst on a school bus, a local service bus, a train or a ferry.** Local authorities are expected to ensure that pupils, parents and school have the opportunity to access literature describing a code of conduct expected of pupils whilst travelling to school.

The majority of journeys to school will not require pupil supervision and there is no statutory requirement for authorities to provide such supervision under the Education (Scotland) Act 1980. However, authorities are expected to keep the matter under review and where deemed necessary to provide supervision, which may take the form of parent or teacher accompanying pupils, employing a supervisor or installing CCTV.

4.6 Pupils with additional support needs

Local authorities are expected to consider any additional support needs identified for individual pupils when providing school transport. Authorities are expected to adapt and tailor provisions accordingly. Authorities should be aware that children with additional support needs may be vulnerable to bullying and should consider whether measures are required to ensure these pupils are treated with courtesy and respect by fellow pupils.

Authorities should also consider the challenges that some children with additional needs have when building relationships with drivers, escorts and fellow passengers.

4.7 Prohibiting access of certain vehicles to school transport routes

Authorities may consider it useful to prohibit access by certain vehicles to some routes in the interest of school transport safety. **The Road Traffic Regulation Act 1984 allows authorities to make Traffic Regulation Orders preventing the use of local roads by vehicular traffic of a kind or in a manner that is deemed unsuitable with regard to the character of the road.** Mandatory regulations can cover small lengths of road or large area networks and can be defined by gross vehicle weight, axle weight, length, height, width or any other readily understood vehicle characteristic.

Authorities can signpost suitable alternative routes although should consider any subsequent cost to the local community.

4.8 Speed and parking restrictions

Authorities have the power to introduce 20 mph zones or speed limits where it is deemed appropriate (see Road Traffic Regulation Act (Amendment) Order 1999). Guidance from Scottish Government on setting 20 mph limits can be found at: http://www.scotland.gov.uk/Publications/2006/08/14134225/0

Authorities can also use Traffic Regulation Orders to restrict parking around schools or to exclude vehicles at particular times.

4.9 School transport contracts

It is the responsibility of education authorities to negotiate the terms of contracts for school transport. The Scottish Consumer Council (2005a) conducted a review of school transport contracts in Scotland. Some of the key recommendations are:

- All drivers and attendants responsible for transporting children to school (including bus, minibus, taxi and parental contracts) should have Enhanced Disclosure Scotland checks undertaken before a contract is awarded.
- Local authorities should liaise with the Vehicle and Operator Services Agency within the Traffic Commissioners Office prior to awarding contracts to obtain relevant information on maintenance and reliability records.
- Local authorities should ensure that standardised conduct training is provided for all school transport drivers and attendants and that this should be quality assured.
- Local authorities should ensure that regular unannounced safety spot checks of school transport vehicles occur either through their own inspections, SPT (Strathclyde Partnership for Transport) (where applicable) or through liaison with VOSA (Vehicle & Operator Services Agency).
- Local authorities should review the level of resources dedicated to monitoring school transport contracts to ensure high levels of vehicle safety and service standards are being met.
- Local authorities should continue to develop aspects of increased pupil safety in school transport, and in particular the need to share good practice and emerging experience in this area.
- All local authorities should have contingency plans in place as recommended in Scottish Executive guidance. This will help to ensure that parents, schools and transport operators are better informed and able to effectively deal with situations as they emerge.

- Local authorities should ensure parents have full information on how to complain and that the outcome of complaints are fed back to help service improvement.
- Local authorities should review the conditions set out within contracts and their arrangements for monitoring their school transport contracts to ensure that both value for money and improvements in quality are kept up to date.

All drivers, attendants and supervisors on arranged school transport will require an enhanced disclosure check by Disclosure Scotland in line with the Protection of Children (Scotland) Act 2003. Where dedicated school transport is provided under contract, authorities are expected to require that only drivers and accompanying adults who have been disclosure checked are employed. Relevant checks should be undertaken by the transport operator.

Authorities and transport operators should also be aware of the new Protecting Vulnerable Groups Scheme (PVG scheme). More information is available at:

http://www.scotland.gov.uk/Topics/People/Young-People/children-families/pvglegislation/

Further detailed advice on driver regulations, and other matters, can be found in RoSPA's (2003) The Safety of School Transport booklet, which can be accessed at:

http://www.rospa.com/RoadSafety/info/schooltransport.pdf

4.9.1 Vehicle type

Authorities are expected to ensure that the type of vehicle used for school transport will be suitable for purpose. For example, the use of a double decker bus may not be suitable on some rural roads. To ensure this, authorities may wish to stipulate certain conditions in contracts with transport operators, for example:

- Exclusion of the use of double decker buses
- Use of minibuses on certain narrow routes
- Use vehicles with 3-point seat belts rather than the minimum requirement of a lap belt
- Use of vehicles fitted with CCTV.

5 Survey of local authorities

5.1 Aim of the survey

The survey of local authorities aimed to answer the following questions:

1. Is school transport safety a priority?
2. What is the extent of local authorities' current knowledge of school transport safety policy?
3. Who do local authorities see as being responsible for school transport safety?
4. Have there been any schemes, trials or evaluations related to improving school transport safety involving local authorities since the 2007 survey of good practice (Skellington-Orr *et al*., 2007)?

5.2 Survey design and distribution

A survey was designed to gather information arising from these questions and can be seen in Appendix B. The survey contained a combination of ranking and open response questions. Open response questions were preferred for certain questions to provide the opportunity for detailed information to be collected.

The survey was intended to be as accessible as possible and was made available online, by email and by post. Recipients were also invited to call TRL and discuss the topic; two phone calls were received. A distribution list of local authority transport contacts was provided by the Scottish Government and these contacts were emailed directly by TRL. The covering email explained the purpose of the research (see Appendix B) and invited recipients to forward the email onto colleagues and other contacts with a responsibility for school transport safety. A three week deadline for responding to the survey gave respondents who were on annual leave or out of the office a chance to respond. The original recipients were emailed a week later to remind them to respond and again they were invited to forward the survey onto any colleagues with a responsibility for school transport safety. A final email reminder was sent two weeks later to confirm that the survey was closing.

Respondents were also sought from the Education Transport ATCO Executive meeting where paper copies of the survey were given to all who attended.

At least one representative of all local authorities in Scotland was emailed with the exception of Western Isles Council as an email address was not available. However, a response was received from Western Isles Council which means that all local authorities in Scotland were aware of the survey and had an opportunity to complete it. A log of automatic email responses was kept to ensure that recipients were not out of the office or on annual leave over the full three week period during which the survey was open to respondents. Two email addresses were returned due to delivery failures although other members of these local authorities were emailed. All other recipients received an email when not out of the office or on annual leave, as measured by automated responses.

5.3 Responses

In total, there were twenty-four responses to the survey. Twenty-one responses were completed online, two were received via email, and one by post. The sample represented fifteen of the thirty-two local authority areas in Scotland; there were therefore multiple responses by some authorities. Two local authorities were represented by three respondents, and five local authorities were represented by two respondents. Single responses were received from eight authorities.

Respondents were asked for their name, local authority and job title, although only the local authority field was required to complete the survey. It was therefore possible for respondents to complete the survey anonymously. Four anonymous responses were received.

A good range of responses was received from different local authority departments and staff roles, including: transport manager, planning officer, sustainable transport assistant, road safety officer, transport co-ordinator, school travel planning co-ordinator, and active schools development officer.

5.4 Results

As participation in the survey was voluntary, there was no control over the sample. It is important to consider this when reviewing results as they may not be representative of all staff at local authorities who have a responsibility for school transport. Further, the results are unlikely to be representative of all local authorities.

5.4.1 Is school transport safety a priority area?

Respondents were asked to rate on a seven point scale whether they considered school transport safety to be a priority area within their authority. The distribution of responses can be seen in Figure 5-1. The data suggest that the majority of those who responded felt strongly that school transport safety was a priority in their authority. One respondent was unsure and one felt strongly that school transport safety was not a priority in their authority. Four respondents did not answer the question.

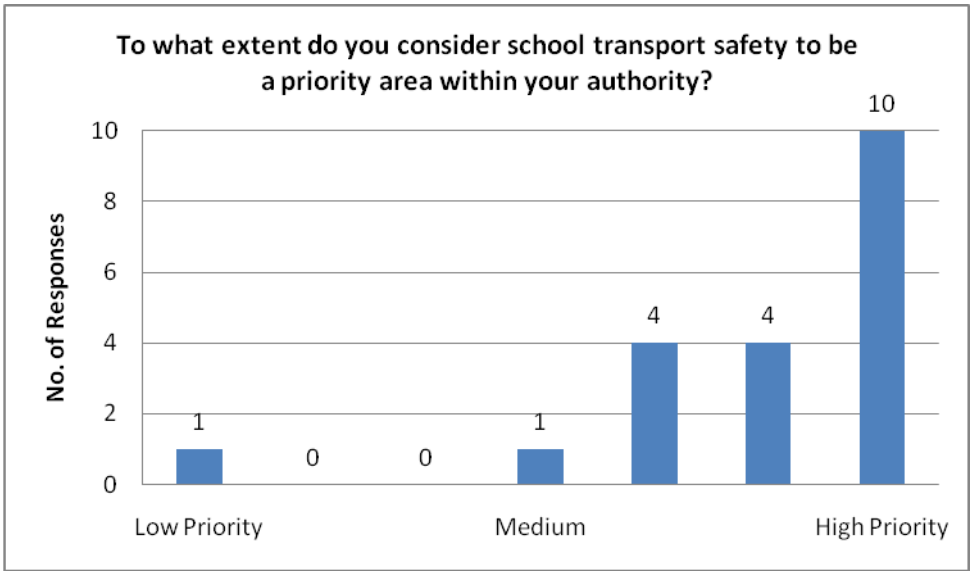


Figure 5-1: Response distribution of the extent to which school transport safety is considered to be a priority area within the respective local authority areas

5.4.2 What are local authorities' views of their knowledge of school transport safety policy?

Respondents were asked to rate their authority's current knowledge of policy relating to school transport safety, on a seven point scale. Figure 5-2 shows the response distribution and suggests that most respondents felt that their knowledge of Government policy was relatively high. One respondent felt that the authority's knowledge of policy was extremely low. Four respondents did not answer the question.

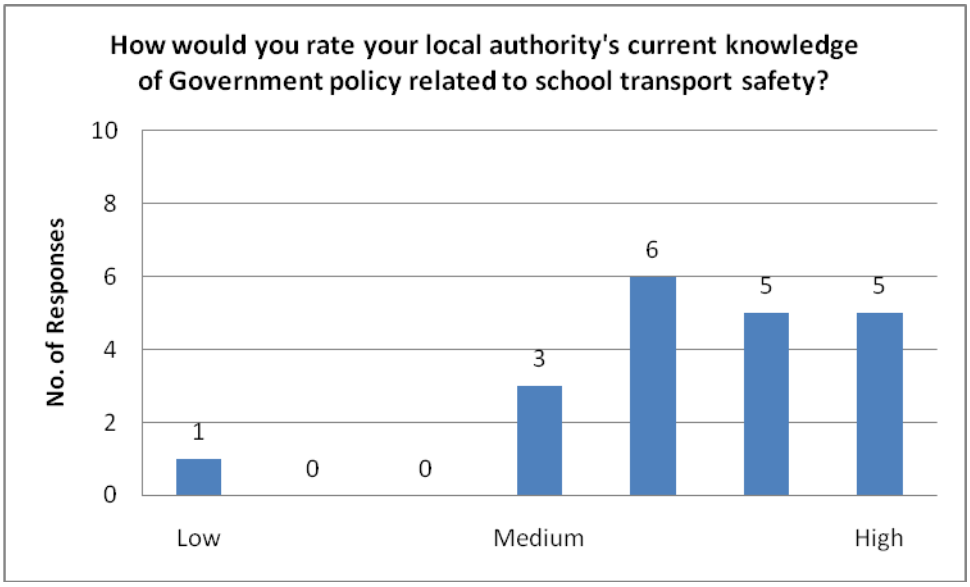


Figure 5-2: Response distribution of respondents' perception of the local authority's current knowledge of Government policy relating to school transport safety

Respondents were also asked how confident they were that their authority was aware of all policy related to school transport safety. The distribution of responses can be seen in Figure 5-3 and demonstrates that the majority of respondents were fairly confident that they were aware of all relevant policy. Nevertheless, in comparison to the ratings of current knowledge, responses were lower and more spread suggesting that while confidence is high for most, some are cautious, while others are not so confident that their authority is aware of all Government policy related to school transport. Four respondents did not answer the question.

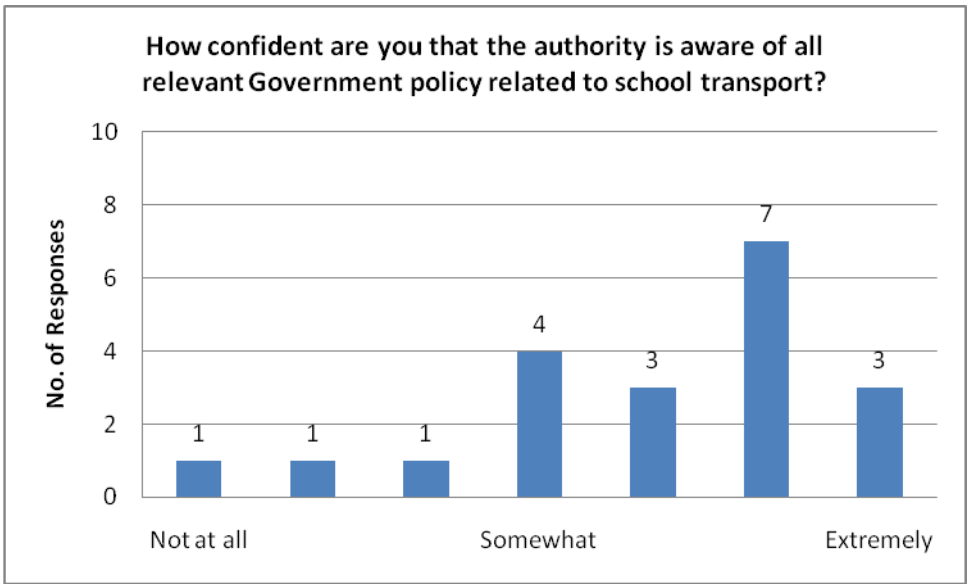


Figure 5-3 Response distribution of confidence that the local authority is aware of all Government policy relating to school transport safety

5.4.3 Who do local authorities see as being responsible for school transport safety?

The literature regarding school travel suggests that there is often confusion as to who is responsible for school pupil safety during the journey to and from school. We asked respondents to divide responsibility between local authorities, bus operators, schools, parents, and any other person or body they see as being responsible for pupils during the journey to school. It is acknowledged that every school journey is different and responsibility is likely to vary, however it was considered of interest to establish the views of local authorities in general. One respondent noted that they answered in terms of pupils who were entitled to school transport.

Four respondents appeared to misunderstand the question and their responses were removed from the analysis; five respondents did not answer the question. The mean division of responsibility from the remaining fifteen respondents can be seen in Figure 5-4.

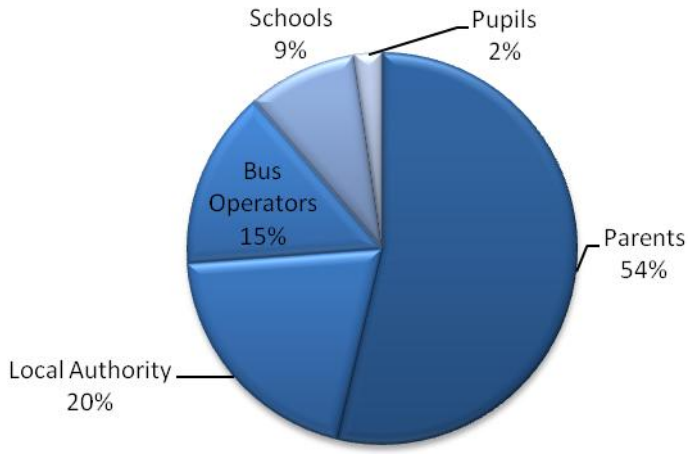


Figure 5-4 Respondents' division of responsibility for ensuring pupil safety when travelling to and from school

Interestingly, respondents overwhelmingly considered that parents bore much of the responsibility for ensuring pupil safety when travelling to and from school. The maximum responsibility allocated to parents was 90% while the minimum was 20%. This is noteworthy as the minimum responsibility allocated to all other parties was zero by at least one respondent.

Local authorities were rated as having the second largest responsibility for pupil safety when travelling to school, although the maximum level of responsibility reported was 50%.

Bus operators were considered to have a reasonable level of responsibility for pupil safety with a maximum of 30% reported.

Schools were also considered to have a reasonable level of responsibility with a maximum allocation of 25% reported.

One respondent added that pupils were 20% responsible for their own safety.

5.4.4 What aspects of getting pupils to and from school do local authorities consider to be their responsibility?

The survey asked respondents what aspects of the school journey local authorities had responsibility for. As it is not necessarily clear what aspects local authorities consider to be their responsibility, an open question was preferred so as not to pre-empt responses and allow respondents freedom to express their opinion. However, open questions require respondents to commit more time to an answer, which may account for twelve respondents not completing the question. The remaining responses were analysed and can be seen summarised in Table 5-1.

Table 5-1: Themes that emerged from open responses describing what aspects of getting pupils to and from school were the responsibility of local authorities

Theme	Description of Responsibility
School Transport Provision	• Monitoring the safety of pick-up and drop-off points • Ensuring contracted vehicles (buses or taxis) meet minimum requirements • Ensuring all pupils who qualify for school transport are provided with it • Ensuring transport is safe and efficient
Policy setting	• Requiring seat belts on all school transport • Setting 20 mph zones around schools • Setting contractors terms and conditions • Setting a home to school transport charter
Engineering	• Providing correct signage around schools • Installing 20 mph zones • Monitoring speed of local traffic around schools • General infrastructure • Creating safe routes to school • Ensuring safe walking routes • Pedestrian crossings • Off-road cycle paths
Behaviour monitoring	• Ensuring CCTV fitted to all school transport • Providing procedures for dealing with poorly behaved pupils on school transport
Staffing	• Ensuring drivers and school crossing patrollers meet requirements for the job & provide a safe service • Ensuring all staff working with children have completed an Enhanced Disclosure Scotland check. • Ensuring that school crossing patrollers are adequately trained and monitored • Ensuring school crossings are patrolled
Co-ordinating	• Working with schools on school travel plans and sustainable initiatives • Informing schools when school crossing patrollers will not be on duty • Encouraging initiatives with road safety officers
Health & Safety	• Ensuring school crossing patrollers wear correct high visibility clothing • General responsibility for pupil safety when travelling on dedicated school transport
Education	• Providing road safety education • Providing road crossing training • Providing cycle safety training

The responses suggest that, overall, local authorities are reasonably aware of their responsibilities and that these responsibilities can be varied. Not all respondents reported on all of the themes in the summary table, suggesting that for many local authorities, or at least the staff representing them in this survey, there are some issues that take priority. That respondents each reported only a selection of responsibilities could be due to certain issues taking prominence within the authority, or the individual respondent's role; alternatively it may reflect time constraints when completing the survey.

5.4.5 Does your local authority have its own policy relating to any aspect of school transport safety?

Respondents of ten of the fifteen local authorities represented in the survey reported that they were aware of the local authority having its own policy relating to school transport safety; although for one authority a second respondent reported that there was no policy. Policies reported in the survey related to:

- School Travel Plans
- Safer Routes to School
- General safety and school travel
- Guidelines for escorts on home to school transport
- Pick-up and drop-off point safety
- Seat belts
- Alighting procedures

Some respondents provided details and links which were reviewed.

Only one council stated that it did not have any policy, while four other authorities involved in the survey were not represented with a response.

5.4.6 Working with others

Respondents were asked whether their authority worked with other parties where school transport safety was discussed. This question was designed to indicate whether local authorities were engaging with other groups and sharing information relating to school transport safety. Ten respondents did not answer this question, and two stated that they were not involved with any other parties.

There were varied responses and details provided by respondents to this question. Authorities involved with Strathclyde Partnership for Transport (SPT) noted that they regularly met with other authorities through this partnership, where school transport safety was often discussed. Others noted that through School Travel Plans authorities engaged with other parties to discuss safety. Three respondents indicated that their authorities engaged with working groups that involved several parties representing different divisions within the authority, road safety officers, police, schools, bus operators and parents.

5.4.7 Involvement with schemes, trials or evaluations to improve school transport safety

Respondents were asked to indicate whether their authority had been involved in any schemes, trials or evaluations in the previous three years (i.e. since the last survey of local authorities in 2007). Ten respondents did not answer this question and four stated that their authority had not been involved with any schemes, trials or evaluations.

Two authorities noted that they had been involved with School Travel Plans over the last three years although it was not clear whether this involved the plans being started in the last three years or whether the plans had simply continued over the last three years.

One respondent noted that 20 mph zones had been implemented around every school in the authority; another noted that seat belts were now required on all school transport in the authority; and another stated that a walk to school week scheme had been started.

Further schemes involved the assessment of school bus pick-up and drop-off points and high visibility lighting fitted to school buses to raise awareness of them to other motorists. These schemes are discussed in more detail in Section 6.4.

5.5 Summary and discussion

The aim of the survey was to collect information that would answer four questions. The first question concerned whether school transport safety was a priority area for local authorities. The results of the survey suggest that of those authorities that did respond, school transport safety is a high priority area[3].

The second question focused on local authorities' current knowledge of Government policy. Of the authorities who responded, knowledge of Government policy was rated extremely highly. Further, respondents were generally confident that the authority was aware of all relevant policy. However, it is likely that those who responded are aware of relevant policy because school transport safety is a priority within their area. The knowledge levels of authorities that did not respond to the survey may not be so high.

The third question concerned who local authorities considered to be responsible for pupil safety on the way to and from school. Responses to this question interestingly revealed that authorities saw parents as being primarily responsible for pupil safety. Research has previously found that parents are often unsure who is responsible for their child's safety on the way to and from school and often assume it is the school or the local authority (Scottish Consumer Council, 2005b). It is clear therefore that a void of responsibility could exist between authorities and parents if roles and responsibilities are not communicated effectively.

The fourth question concerned establishing whether there had been any further schemes, trials or evaluations related to school transport safety that had taken place in the last three years. It was revealed that there were a few trials of new safety measures in the last three years as well as a reasonable level of implementation of existing schemes like school travel plans. It is unknown whether authorities who have not responded to the survey have undertaken schemes, trials or evaluations, although conversations with some local authorities suggests that other significant work is unlikely to have taken place.

The survey has established that almost half of Scotland's authorities see school transport safety as a high priority and subsequently have good knowledge of relevant policy. These authorities also acknowledge the large variety of responsibilities that they have for pupil safety. However, even for these authorities, there is an indication that parents are seen as primarily responsible for pupil safety on the way to and from school. Defining and outlining school transport responsibilities may help local authorities realise their level of responsibility and calibrate this with parents' views, and others involved in school transport provision. Local authorities should communicate responsibilities with transport operators, schools, parents, pupils and all others who they deem responsible for safety on the school journey. If responsibility is not defined then a diffusion of responsibility can take place whereby ownership for improving safety is considered to be someone else's problem.

[3] As responses to the questionnaire are self-reported, these may be affected by a positive response bias.

Not all local authorities responded to the survey and the results cannot therefore be guaranteed to be representative of all authorities across Scotland. It is likely that the sample reported here is biased towards authorities that already consider school transport safety to be an important topic.

6 Literature review

This chapter presents topic areas relevant to school transport safety and summarises literature pertinent to the safety of children on the school journey. The literature reviewed and discussed originates from a wide variety of sources, nationally and internationally. Information is discussed from a scientific perspective so as to highlight evidence and risk where possible. Literature within some topic areas is summarised so the reader can gain an appreciation of the key points when applied to school transport safety.

6.1 Local authority good practice

A survey of local authority best practice with respect to school transport was reported in 2007 (Skellington-Orr *et al*., 2007). While the survey was not specifically focused on safety, safety was incorporated within one of its three aims. The survey established that much of the good practice reported by local authorities concerned improvements to the 'school zone' and related to School Travel Plans (STPs) and Safer Routes to School (SRTS); these are discussed in more depth in Section 6.6.1. Twenty-Five of the thirty authorities who responded to the survey stated that school access areas had been improved in recent years to improve pupil safety. A similar number of authorities also stated that they used Road Traffic Regulation Orders to restrict traffic around schools at peak times. Between 2003 and 2008 the (then) Scottish Executive committed £50 million to local authorities to implement 20 mph limits and traffic calming outside schools and by March 2008, it was estimated these limits were in place at 83% of Scottish schools (Scottish Government 2009).

Other methods of engineering used to improve safety included the use of retractable bollards to prevent vehicles from parking near the school and providing separation between traffic and pupils. Authorities reported the following schemes to have improved safety:

- 20 mph schemes
- School Travel Plans (STPs)
- Safer Routes to School
- Cycling, Walking and Safer Street (CWSS) schemes

The report found that school travel co-ordinators provided a link between school transport and wider transport policies but the discontinuity of the post in some local authorities was undermining this scheme. However, other good practice established from the survey included:

- The use of CCTV on school buses to monitor pupil behaviour and seat belt use. Pupils and parents appear to prefer this option to the use of attendants or supervisors.
- 'Codes of Conduct' for pupils to provide guidance on safe and acceptable behaviour on the way to and from school.
- Educational materials for pupils to provide guidance on safe and acceptable behaviour on the way to and from school.
- Kerbcraft and Safer Routes to School schemes were popular and impacting positively on pupil safety.

The report suggests that as VOSA already perform spot checks to ensure that vehicles used by contractors are fit for purpose, local authorities should be concerned with checking that providers are complying with the conditions of their contract. With the responsibility for maintaining vehicle standards sitting with transport contractors and VOSA, local authorities should instead focus on driving standards.

The Scottish Consumer Council's 'Review of School Transport Contracts in Scotland' (2005a) found that three-quarters of local authorities provided Codes of Conduct setting out what is expected of drivers and how they should behave. However, it is reported that these codes are simply passed onto transport providers to implement without follow-up (Skellington-Orr *et al*., 2007). The Scottish Consumer Council research suggested there is evidence that some authorities require drivers to attend council-approved driver training courses which deal with managing pupils, although the 2007 survey of local authorities found that where there is driver training for school transport operators it does not prepare drivers for how to handle school children. Authorities could work together to standardise the training that contractors use for school bus drivers to ensure consistency of service from one area to another. Further discussion of driver training is covered in section 6.4.3.

6.2 Pupils' and parents' perceptions of school travel safety

The survey reported in Section 5 established local authorities' views relating to school transport safety. However, the views of both pupils and parents are equally important, especially as safety is cited as a major barrier that prevents parents allowing their children to use school transport, walk or cycle to school (Sonkin *et al*., 2006). A report by the Scottish Consumer Council (2005b) established the experiences of travelling to school through focus groups with both parents and pupils, and a further survey of 892 pupils across Scotland. Relevant results have been categorised and summarised in the bullet points below.

6.2.1 Pupils

Safety

- Safety was raised as a concern by a large number of pupils when prompted to identify the worst aspect of travelling to school.
- Just over one-third of pupils agreed that the school or public bus felt safe. However, thirty-one percent of school bus users and 28% of public bus users did not feel that the bus was safe.
- Only 31% of pupils said they had received guidelines regarding travelling to and from school safely.
- Almost three-quarters of pupils who walked to school were happy that the route to school was safe. However, 12% were not happy that their route was safe.
- Pupils were happy about the areas where they were picked up and dropped off by school transport.

Overcrowding, behaviour and seat belt use on buses

- Overcrowding on buses sometimes occurred (4% of pupils in the survey reported never being able to get a seat on the school bus; 3% for local buses).
- Pupils are not as concerned about behaviour on buses as parents are but think that behaviour would improve if there was a supervisor on the bus.
- Pupils hold mixed views about wearing seat belts. They may be made fun of for wearing one and no one asks them to.
- Because some buses don't have seat belts (e.g. public use buses), it is not considered important to wear seat belts on buses, even when they are provided.
- 59% of pupils surveyed stated that they did not use seat belts on school buses when they were provided.

- The main reasons for not wearing a seat belt on a school bus when available were: 'Do not think about it' (38%); 'Not made to' (17%): 'Not comfortable' (17%); 'Journey is too short' (9%); 'Would get laughed at' (7%); 'They are often broken' (5%).

Seat belt use in the car

- 69% of pupils said they always wore a seat belt when being driven to school in a car; 38% percent said they usually do; and 10% said sometimes. Only one pupil said they never wore a seat belt in the car.
- The main reasons for not wearing a seat belt in the car included: 'Forgot' (39%); 'Journey is too short' (22%); 'Do not think about it' (17%); 'Not comfortable' (11%). Half of the pupils who indicated that the 'journey was too short' also reported that the journey to school was in excess of 10 minutes.

Other research has reported that 38% of children who take the car to school would rather walk or cycle (DTLR, 2000) which suggests that if viable, safe walking or cycling alternatives are promoted then there is a section of pupils who could be easily persuaded to change transport mode.

6.2.2 Parents

Responsibility, communication and interaction with local authorities

- Parents are unsure who is responsible for their children on the way to and from school, with many assuming it is the school.
- Parents felt that the communication of information about the school bus service was poor (e.g. appointments of contractors, scheduling, bus pass management, arrangements in poor weather).
- Parents felt that the communication of information about the school bus service was poor.
- Parents would like to be more involved, or at least more informed, in the selection of the school bus contractor and find it frustrating when contractors change during a school term rather than between academic years.

Safety

- Parents in urban locations were concerned by overcrowding on public buses.
- Parents were happy about where their children were picked up and dropped off by school transport.
- Parents from rural areas were concerned about pupils not wearing seat belts due to the types of roads the buses travelled on.
- Parents are as concerned about 'stranger danger' as they are about safety (Bradshaw & Jones, 2000).

Pupil behaviour

- Parents from urban areas felt that bad behaviour by pupils on buses was a major issue and was unsafe.
- Parents were concerned about bullying on the bus and thought that the bus journey could be supervised or have CCTV installed. They felt this would also increase seat belt wearing rates.

6.3 Why are children more at risk on the roads?

Whatever the main mode of transport used to get to or from school, at some point of the journey most pupils will interact with public roads and are likely to be classed as pedestrians. This may include simply accessing a pick-up area or being dropped off and crossing the road to school or to home. As noted in the accident analysis in Section 3, school children are at highest risk as pedestrians and cyclists, with many casualties coded as 'pedestrian' having occurred shortly after leaving a vehicle. Understanding why young children are at increased risk when interacting with the public highway is important when considering interventions to improve safety.

Research (Austroads, 2002) suggests that young children:

- Have underdeveloped peripheral vision resulting in a narrower field of view
- Have more difficulty determining the direction of sounds
- Are poor at accurately determining the speed of approaching vehicles
- Do not understand the time and distance required for a vehicle to slow or stop
- Overestimate their abilities to cross the road safely and their conspicuity to others
- Are easily distracted
- Tend to focus on one thing at a time
- Are easily hidden by roadside furniture or parked or moving vehicles.

Studies have identified that young children are vulnerable when interacting with the road environment for a variety of reasons including poor perceptual and cognitive skills, developmental factors, impulsive actions, social pressure and peer dynamics (Assailly, 1992; Ampofo-Boateng & Thomson, 1991; Van Schagen, 1988; West *et al*. 1999). Young children tend to cross the road without stopping and looking (Granie, 2007), a trait that diminishes as they get older and acquire the ability to develop safe crossing procedures (Gaskell *et al*. 1989). Ampofo-Boateng *et al*. (1993) found that when asked to select a crossing route, 5- and 7-year-old children would generally select the most direct route, even where it involved crossing between parked cars and other obstacles. In contrast, 11 year-old children were found to select more appropriate crossings even where it was not the most direct route. Likewise, Dunbar *et al*. (2001) found that 10-year-old children were more likely to allocate their attention towards the road when approaching to cross whereas 6-year-old children were more likely to continue talking and lacked concentration when approaching the road.

Research in this area has established that while younger children suffer from under-developed motor and cognitive abilities, older children may not always use their knowledge and skills properly when crossing (Rosenbloom *et al*. 2009). A survey of 2,433 English school pupils aged 11–16 years found that while 11 to 12-year-old females were most likely to carry out desirable road safety behaviours, older respondents (13–16 years) and males were more likely to report less desirable road safety behaviours. In addition, pupils from schools in rural areas were more likely to report dangerous play in the road than pupils from urban areas. It must therefore be acknowledged that school pupils' behaviour when interacting with roads is influenced by a complex mix of individual, social and environmental factors. Even when motor and cognitive skills have developed and are trained, other influences can impact on behaviour around roads and traffic.

6.3.1 Walking or cycling in groups

Research by TRL for the Department for Transport identified subtle and complex changes in attitudes and behaviour through adolescence that impacts on road safety related behaviour (Chinn *et al*., 2004). The research found that risk in groups was highest for girls and for pupils aged 13–14 years. Individually adolescents behave less safely when

in groups, however this increased risk is somewhat mitigated by the increased conspicuity to other motorists as a result of being in a group. Perhaps related to conspicuity, it was established that small groups (i.e. with one to three others) were most at risk. It was found that small groups were unlikely to look both ways when crossing and were more likely to be distracted by talking to friends. Despite this, pupils reported that they behaved more sensibly and more safely when crossing with just one friend. The research concluded that adolescents as pedestrians and cyclists were making appropriate safety checks on the road but it is possible that they do not accurately assess the situations completely or make misjudgements (Chinn *et al*., 2004). Chinn *et al*. (2004) note a comparison with novice driver literature whereby adolescents may require experience over time to learn to fully appreciate the dangers they face. In support of this, Lewis *et al*. (1998) found that children who walk to school demonstrate an awareness and understanding of road danger earlier than less experienced children.

6.3.2 Bullying

The journey to and from school is often unsupervised and therefore offers the potential for bullying to take place. Bullying is an extensive topic that is beyond the scope of the current report. The effect of bullying in relation to school transport safety relates to the wellbeing of pupils who are being bullied, the potential to impact on the safety of other pupils and the potential to distract the driver on school transport vehicles; in most circumstances this will be a bus or minibus. In the first instance, it is expected that local authorities and schools have anti-bullying campaigns and procedures in place for dealing with bullying. On school transport, the use of CCTV is cited as the preferred option for controlling pupil behaviour and local authorities may wish to insert this requirement into their contracts should there be concerns for widespread bullying (Skellington-Orr *et al*., 2007).

The Skellington-Orr *et al*. (2007) report details some best practice approaches to bullying on school transport from schools and local authorities in England and Wales.

A further source of information is the Bullying online resource http://www.bullying.co.uk that provides advice for children and young people on bullying, including bullying on the way to school.

6.4 School transport safety

6.4.1 Risk assessing school transport routes and pick-up and drop-off points

Local authority provision of school transport often requires pupils to congregate at specific points along a route to increase the efficiency of the transportation. This section reviews literature relating to the safety of these points and generally refers to school buses; however the safety principles covered also apply to minibuses and taxis when using pick-up or drop-off points. While parents have responsibility for the safety of pupils from home to the school bus stop, the location of the stop is the responsibility of the local authority and consideration of pupil safety is therefore required.

Not all pick-up and drop-off points used by school transport are dedicated stopping areas, especially in rural locations. This is an important consideration as school bus related casualties often occur with the child as a pedestrian (i.e. crossing towards or away from transport). Safety improvements to the areas where pupils are dropped off or picked up could therefore reduce casualty risk for these types of accident.

Based on this assumption Queensland, Australia started a programme in 1996 to review approximately fifteen school bus routes a year that are deemed to be the most dangerous. Funding is allocated each year to upgrading these routes to improve the safety of using school buses on them (LTSA, 2002). In addition to detecting problem

areas, auditing school bus routes and pick-up and drop-off sites raises confidence among parents and pupils that using the school bus is a safe alternative to car travel. In absolute terms, travel by school bus is safer than by car hence attracting new pupils to use the school bus would in itself reduce casualty risk.

6.4.1.1 'Pick-Up and 'Drop-Off' (PUDO) points

In identifying school bus stop areas as a safety problem, West Dunbartonshire Council and Strathclyde Partnership for Transport (SPT) funded MVA to develop an assessment tool for school bus 'Pick-Up and Drop-Off' points (PUDO). The PUDO assessment tool requires a trained assessor to visit PUDO points and carry out an on-the-spot assessment (McDonald *et al*., 2008).

The assessor is expected to consider the following when carrying out a PUDO assessment:

- What if a child or children stand at the PUDO?
- What if the child or children cross the road near the PUDO?
- What if a child falls immediately at the PUDO into the path of oncoming traffic?
- How will a vehicle picking-up or dropping-off children at the PUDO interact with other pedestrians and road users?

The assessor records data such as approach visibility, road widths, footway widths, speed limits, guardrails, lighting, and stopping location.

The method used to assess PUDO locations involves a calculation of risk based on vehicle speed and safe stopping distances multiplied by a personal judgement of the likelihood of that hazard occurring. Items scoring highly can then be associated with possible remedial action to mitigate the risk.

The assessment tool was initially piloted on twenty sites in West Dunbartonshire and later trialled at a further 155 sites. Of these, one in seven sites were categorised as high hazard, although some only required minor remedial action (McDonald, 2008).

Development of a portable data logging system is underway with Dumfries and Galloway Council allowing for assessments to be directly downloaded and synchronised with GIS mapping systems. To support the PUDO assessment tool there is a user manual, training manual and definitions guide.

6.4.1.2 Other assessment and evaluation guidelines for school transport stops

Guidelines within a 1998 American report on the identification and evaluation of hazards on school bus routes broadly support the principles of the PUDO assessment exercise with regard to the necessity to ensure safe pick-up and drop-off areas. However, the mechanism for assessment differs in that the central focus within the American guidelines is on communication between school bus drivers and route managers (NHTSA, 1998). The report distinguishes between 'school bus route hazards' (e.g. level crossings; dangerous junctions) and 'school bus loading zone hazards' (e.g. no pavement, poor visibility for other motorists). Through assessment, 'school bus route hazards' can be communicated to drivers by authorities; conversely 'school bus loading zone hazards' experienced by the drivers can be fed back to route managers and authorities for appropriate action. This form of assessment places responsibility on the school bus driver and appropriate training of risk assessment and reporting procedures would be necessary. Nevertheless, it is reasonable to consider the school bus driver as having the primary position to experience near-misses and identify potential risks to pupils. Further, the perspective from a bus may differ from that of an external assessor standing by the road side or approaching by car.

New Zealand has also issued guidelines for the assessment of school bus routes and school bus stops (defined as those not used by public buses). Table 6-1 summarises the main guidelines that would also be relevant in Scotland and an example of the assessment forms can be found at: http://www.nzta.govt.nz/resources/siting-school-bus-stops/docs/siting-school-bus-stops.pdf

Table 6-1: Key factors to optimise safety as suggested within LTSA (2004)

Key Factors to Optimise Safety	Description
Visibility	School bus stops should be sited where they are clearly visible to motorists based on the minimum distance required for the speed limit of the road. Motorists from both directions should be able to clearly see school bus stops to allow them time to slow down. NB. In New Zealand a legal limit of 20 km/h is enforced when passing a stationary school bus.
Adequate pull-in area	Ideally a school bus stop should have adequate space to allow the bus to pull in and allow traffic to pass safely. In areas where this is not possible, ensuring clear visibility of the bus stop is crucial.
Hazards getting to the bus stop	Consideration should be given to the route that pupils will have to take to approach the bus stop. For example, is there a pavement; if not, will the pupils always be visible to motorists when walking at the side of the road? Are there adequate crossing facilities on approach to the bus stop?
Space for students to stand back from the road	Firm, dry waiting areas, away from the road should be available to pupils. Pupils worried about dirtying shoes or clothes may be tempted to stand closer to the road, especially in poor weather.
Space for vehicles to stop	The number of pupils using a stop and therefore the effect of parent/caregiver drop-off and pick-up should be considered due to the effect on other traffic and safety. Again, visibility of the bus stop is emphasised.
Weather conditions	What are pupils likely to do in poor weather conditions? Where will they wait and will this put them at increased risk?
Consultation	It is a good idea to consult with the school bus operator and driver(s) with regard to school bus stop safety.

In November 2009, the Welsh Assembly Government issued guidance on home to school transport risk assessments with the expectation that local authorities would ensure that all home to school transport routes were risk assessed by August 2011. The assessment tool that accompanies the guidance is based on the premise that school transport contractors will complete the risk assessments for each route they cover. For each route, all route specific risks should be identified including pick-up and drop-off areas. For each pick-up and drop-off area with an identified risk, a further form is to be completed detailing the identified risks. Contractors have also to report where they have taken action to mitigate identified risks or where local authority action is required. There is no mention within the guidance that contractors are given any training to identify risks beyond the examples given within the document.

6.4.1.3 Summary of risk assessing school bus stops

School bus pick-up and drop-off points, especially in rural areas, rarely benefit from the safety infrastructure that dedicated public bus stops often have (e.g. lay by, safety fencing, shelter). Given that school bus related crashes often involve pupils who have recently disembarked the vehicle, the location of the school bus stop is intuitively an important consideration for reducing the risk of pupil casualties. Several local authorities in Scotland have identified this approach as being important and already have experience of the PUDO assessment tool. However, it is worth noting that to date there is no report of the effectiveness of reducing casualties due to the use of the PUDO assessment tool, or any other assessment system reported here. Elvik and Vaa (2004) also report having found no scientific studies that measure whether casualty figures are affected by the way in which bus stop sites are chosen. The approach of risk assessing pick-up and drop-off points therefore relies on the identification of casualty risk through accident analysis. Despite no evaluative evidence, it is clear from accident analysis that pupils are at high risk upon disembarking the school bus in the afternoon, therefore, assessment and remedial action of the areas where pupils are being dropped off is likely to improve safety if consideration of pupil movement (e.g. pedestrian desire lines) is taken into account. The resultant effect of such assessment and remedial action should also have a general safety benefit, for example improving the safety of pupils when waiting for the school bus.

Personal communication with local authorities as part of this research has identified concern with regard to performing school bus stop risk assessments. Some local authorities in Scotland can have around 4,000 school transport pick-up and drop-off areas which represents a large amount of staff time and cost to assess. Further, once there is a commitment to assess these stops and risks have been identified, will authorities have the finance required for remedial work? If not, how will they prioritise their spending and what position will this leave the authority in should a casualty occur at a site with an identified risk that was not treated due to financial restraints? From a safety perspective there is good reason to perform continued risk assessment of all school transport pick-up and drop-off points in Scotland, however practical, financial and legal barriers may put local authorities off implementing such procedures.

6.4.2 Passing school buses

As discussed in Section 3, travel to and from school by bus is most risky when a child alights from the bus on the return journey in the afternoon. Research has investigated the specific reasons for the casualty difference between the morning journey and the afternoon journey (Road Safety Bureau, 1992). On the journey to school, pupils will congregate at pick-up points usually before the bus has arrived, hence the bus does not block the view of other motorists while the pupil is crossing. When pupils are dropped off at school it is likely that facilities or procedures are in place for safe drop-off. In addition, when dropped off at school, pupils will disperse in a similar direction (i.e. towards the school) which would be an expected behaviour by other motorists and is likely to take place in large groups. In the afternoon however, pupils are dropped off at irregular stages, usually beside the public highway, and the dispersion of pupils upon leaving the bus is unpredictable. Further, the bus can also act as a visual barrier between pupils and other motorists.

Research in New Zealand (LTSA, 2002) has indicated that casualties often occur as a result of the pupil appearing from behind the front or the rear of the bus which has hidden the pupil from view to passing motorists. The bus therefore prevents other motorists from predicting crossing behaviour because the driver cannot see the pupil start to cross, and possibly because the driver is aware of pupils moving in another direction which leads them to assume that no pupil will cross their path from behind the bus. Passing a stationary bus in a busy urban environment or on a single lane rural road is likely to be a reasonably demanding driving task. Motorists' may experience higher

than normal mental demand[4], especially if moving into the opposing lane of the carriageway, and in such conditions the driver may attend to immediately visible risks (i.e. oncoming traffic) rather than potential risks (i.e. a child may cross from behind the bus).

Identifying the specific nature of risk in this situation allows us to consider options for heightening drivers' awareness of the potential for pupils crossing from behind a stationary bus and for increasing drivers' time to respond should a child surprisingly appear on the carriageway.

6.4.2.1 Signage

School buses are required to show the yellow school bus sign at the front and the rear of the vehicle when carrying school pupils (see Figure 4-2 on page 35) to and from school and on school trips. The sign has minimum size requirements but there is no regulation of where the sign must be placed other than it must be plainly visible. In addition, there are no requirements for the sign to be removed when the bus is not carrying school pupils.

This sign shows silhouettes of two children holding hands on a yellow reflective background with a black border. While the sign in the UK is similar to other school bus signs in Europe, research is currently underway to design a single European school bus sign (Egger, 2010). This research has identified three key factors that contribute to effective school bus signs:

1. A dynamic image of children in motion leads to an emphasis on danger;
2. Clarity is important and unnecessary detail should be omitted;
3. Graphical elements should be minimised so that the position of arms and legs, for example, do not lead the sign to be misunderstood.

The purpose of the school bus sign is to make other road users aware that the vehicle is carrying school children, and that when stationary, school children are likely to be embarking or alighting from the vehicle. In turn, it is expected that motorists will proceed with care when passing a stationary bus displaying the school bus sign. The Highway Code (DfT, 2007), section 209, states: "Drive carefully and slowly when passing a stationary bus showing a 'School Bus' sign as children may be getting on or off".

Thornthwaite (2009) notes that current guidance leads to signs being misused (e.g. the wrong sized signs are often used) and that signs are often in place when buses are not carrying children. It is suggested that this results in a diluting of the meaning for other motorists who may not necessarily associate the sign with the presence of school children because much of the time there are no school children present around buses showing the sign. Thornthwaite (2009) states that it is doubtful whether the sign has any effect on driver behaviour around buses at all.

In support of Thornthwaite's claim, a recent survey of motorists in Aberdeenshire found that only 70% understood what the traditional school bus sign meant (Fraser, 2010). In addition, the majority of a small survey of bus drivers reported that in their experience, other motorists did not understand what the sign meant and that speeding around the school bus, dangerous driving around the school bus and overtaking without due care were all common occurrences (Fraser, 2010).

In response to these problems, trials of a new more easily identifiable school bus sign (see Figure 6-1) in Aberdeenshire have been carried out. It is reported that motorists find it easier to understand and a survey of bus drivers who trialled the new sign on their

[4] Mental demand, or workload, refers to the amount of mental and perceptual activity required to complete a task successfully. It involves processes such as thinking, deciding, looking and searching. Mental demand and workload has been extensively studied when driving and it has been shown that safe driving declines as mental demand increases. For example, there is extensive literature demonstrating the decline in driving performance as a result of undertaking a mobile phone conversation when driving (see Burns et al., 2002).

buses in Aberdeenshire reported noticing positive behavioural changes by other motorists around their bus (Fraser, 2010). Although self-report data such as this needs to be treated with caution, the finding is nonetheless encouraging.

Figure 6-1: New design of school bus sign trialled in Aberdeenshire

In Canada, advance warning of school bus stops have been trialled in Alberta. The signs stating "SCHOOL BUS STOP AHEAD" alongside a diagrammatical picture of pupils alongside a bus are supposed to raise awareness of the likelihood of school pupils near the road ahead (Government of Alberta, 2009). However, it is cautioned that these signs may cause motorist apathy if wrongly positioned, and as there appears to be no evaluation of the effectiveness of installing the signs, the safety benefit of this approach is unknown.

6.4.2.2 Speed limits

Countries such as the USA, Canada, Australia, New Zealand and Sweden enforce legal restrictions on motorists passing stationary school buses when picking up or dropping off children. Laws in the USA prohibit motorists from passing a stationary school bus that is using its flashing lights and stop arm. The level of prohibited overtaking varies by state from 'no passing' to 'proceed with caution'. Similarly, New Zealand requires motorists to drive at a maximum of 20 km/h when passing a stationary school bus. The Land Transport Safety Authority (LTSA) in New Zealand reports that a 20 km/h limit was designed to protect children and that requiring vehicles to stop completely for a stationary school bus would not be of sufficient further benefit given the nominal risk to children at 20 km/h (LTSA, 2001). It is reported that this initiative has been plagued by enforcement difficulties (Austroads, 2002). The USA also experiences enforcement difficulties with an estimated 50,000 vehicles illegally passing school buses every day in New York State alone (NY GTSC, 2009). Thornthwaite (2009) suggests that enforcement of passing laws is not the only problem. Thornthwaite states that it is dangerous to condition school children to believe that traffic will respond to their presence when embarking or alighting from the school bus. This creates a situation where children may consider that it is other motorists' responsibility to ensure their safety even when using public buses or other non-school transport. It must be noted that this is speculative and there appears to be no specific evidence to support this notion.

A Swedish simulator study has however tested the effect of bus signage and flashing lights after the introduction of a 30 km/h law when passing school buses (Kircher *et al*., 2007). Twenty-eight participants who had been informed of the new law drove a test

route where they passed eight bus stops, four of which had a stationary school bus; two on each side of the road, at speeds of 70 km/h and 90 km/h. It was found that drivers were more likely to comply with the new law when the bus was on their side of the road. The largest speed reductions were unsurprisingly found in the 90 km/h condition, however, the most interesting finding was the effect of signage. A bus without signage did not induce the same speed reduction as a signed bus (involving a school bus sign and a 30 km/h sign), suggesting that drivers understood the meaning of the signs. Further, the use of flashing lights caused drivers to reduce speed earlier, before the signs were in view. An earlier reduction in speed could be an important safety benefit as a further speed reduction may then occur closer to the vehicle when the signage comes into view, although this pattern of behaviour is not confirmed in the report.

6.4.2.3 School bus conspicuity

Australian research established that drivers should be made aware of a school bus from 261–424 metres away to enable them to reduce speed gently from 100 km/h to 40 km/h (62 mph to 25 mph) to pass the bus safely; some areas of Australia, like Tasmania and New South Wales, impose a 40 km/h speed restriction when passing stationary school buses (Paine & Fisher, 1996; LTSA, 2002). At 60 km/h (37 mph) a range of 100 metres is required for safe braking to the 40km/h limit and the researchers suggest that a standardised flashing light signal on school buses should be visible 250 metres away.

Australian trials in Tasmania and Western Australia suggest that two briskly flashing amber lights accompanied by the school bus sign is the most effective combination for modifying motorists' behaviour when passing a school bus (LTSA, 2002). It is not clear how this was measured and it is, therefore, assumed that the lights were effective in reducing drivers' speed. It is also noted that to date, there is no documented evidence that these initiatives have reduced school bus-related accidents or casualties (LTSA, 2002).

Our survey established that Moray Council has installed high visibility LED lighting to the rear of some school vehicles operating in rural areas to increase their visibility to other motorists. The scheme, which has been approved by the local constabulary, has not been evaluated and was implemented based on local knowledge and a perceived area of risk. A similar scheme is being run by East Riding Council of Yorkshire.

King (1999) developed a fluorescent strip for school buses based on consultation and research evidence available at the time. The fluorescent strip was trialled to determine if drivers noticed the strip or if school bus drivers, pupils and parents noticed any change in motorists' behaviour around the buses. The trial found little evidence to support the notion that the fluorescent strip raised awareness of the school bus.

It is worth noting that there may be some issues related to the attention grabbing nature of some signage and flashing lights used to attract drivers' attention. For example, if drivers have their attention drawn to the bus, they may be less likely to look in the places where children may be. Further research of pedestrian and cyclist conspicuity is discussed in section 6.6.6 on page 72.

6.4.2.4 SeeMe®

SeeMe® is a system developed with the aim of increasing motorists' awareness of school pupils around school transport pick-up and drop-off areas. The system requires the installation of a school bus stop incorporating a sign and flashing lights (see Figure 6-2). Pupils are required to carry a transponder that communicates with the school bus sign whenever the pupil is within an adjustable range between 5 and 200 yards. When a pupil is within range, the flashing lights on the sign are activated, signalling the presence of pupils to oncoming motorists.

Figure 6-2: SeeMe® school bus stop with flashing lights at the top activated by the presence of pupils carrying transponders

In addition to increasing motorists' awareness of the likely presence of pupils, it is claimed that the signs result in motorists reducing their speed around the signs. Swedish evaluations report an average reduction in speed of 13km/h (8 mph) on a 70km/h (44 mph) speed limit road (Jeppsson and Varedian, 2008) with reductions up to 20km/h (12 mph) (Anund *et al*., 2003).

In 2009, three local authority areas (Aberdeenshire, Aberdeen City and Moray) trialled the SeeMe® system. A pick-up and drop-off area from each authority area was selected after suitable sites were shortlisted. Pupils and parents of the selected areas were educated about the system and pupils given transponders to carry. There was also a press release at the launch of the trial. An evaluation of the trial consisted of analysis of before and after speeds, and questionnaire-based feedback from parents, pupils, bus drivers and other motorists (Fraser & Nilsson, 2010). A summary of the evaluation is presented here.

Speed evaluation

The Aberdeenshire site had SeeMe® stops installed on both sides of a single lane national speed limit carriageway. The analysis of speed at this site involved a comparison of before and after average speeds measured during pupil pick-up time in the morning (07:45-08:45) and pupil drop-off time in the afternoon (15:30-16:30). In addition, a control period between 12:00 and 13:00 was measured, where no pupils or school buses would have been expected. The results suggested that average speeds in the morning decreased by 6-7% (around 3 mph); while in the afternoon speeds were reduced by approximately 4-5% (around 2 mph). However, average speeds also reduced during the control time when it is assumed there were no school pupils or buses, hence no flashing light warnings. While the reduction in overall speed is encouraging, it is not therefore clear whether simply the presence of a new sign installation has caused much of the speed reduction rather than the interactive system when pupils are in the vicinity of the sign. However, further analysis of a 15 minute period around when the bus was expected in the morning suggested that speeds reduced by around 8% at this time. The

other trial sites in Aberdeen City and Moray also reported before and after speed reductions of similar magnitude to those found at the Aberdeenshire site. Further trials of the SeeMe® technology undertaken at various other sites across Aberdeenshire suggested that the system continued to deliver speed decreases, with reductions generally in the region of 6-10%.

Given the established relationship between speed and accidents, a reduction in speed around the pick-up and drop-off points would be expected to have a safety benefit for school bus related incidents. What is unclear however is whether the speed reduction can be maintained or whether average speeds will increase to prior levels after some length of time. The SeeMe® trial sites were measured for approximately one month after installation with weekly average speeds appearing to remain constant. The next step would be to understand if this speed reduction can be maintained over a longer period of time.

Feedback

As part of the evaluation, feedback was sought from parents, pupils, bus drivers and other motorists. In a focus group with pupils involved in the trial it was found that the system worked as it should with the flashing lights starting as they approached the bus stop. The pupils also reported that they thought other motorists' speeds had decreased at the site.

Of thirty-seven responses from other motorists to the question "How has the SeeMe® system affected your behaviour when driving?", 32% of respondents stated that it made them slow down, 25% stated that they slowed down only when the lights were flashing; and 29% said it had no impact.

Of the seven bus drivers who responded to the survey, all stated that the signs had had no visible impact on the driving behaviour of other motorists.

6.4.2.5 Smart Safe School Bus

In advancing the SeeMe® system, the Swedish Road Administration and Transport Research Institute (VTI) devised a list of desirable in-vehicle systems that would support school bus drivers in improving the safety of the pupils they transport. Using off-the-shelf technology, two trial buses were equipped with a driver support system that facilitates communication between the driver and the pupils while raising drivers' awareness of safety issues. The system incorporated a navigation system with information regarding each school bus stop and information on each pupil expected at that bus stop. The pupils' SeeMe® transmitters communicate with the bus system to inform the driver which pupils are at the stop or close to the stop, and automatically displays a picture of each child. If a pupil is absent from the bus stop, the driver can use the contact details to check whether the pupil should have been collected that day. In addition to the navigation and pupil information system, the buses were installed with a seat belt usage detection system and CCTV inside and outside of the vehicle. To supplement the bus systems, drivers and pupils received training to work the system.

The trial established that most drivers found the system to provide a greater level of routine and support that allowed them to have an enhanced perspective of pupil safety (Anund *et al*., 2009). However, some drivers felt that their job was to simply drive the bus and found the system to be an interference. Pupils meanwhile reported that the system made them feel more secure and experienced less stress, especially when on the way to the bus stop as the transmitters signalled to the driver that they were in the vicinity of the bus stop.

The English language report of this trial notes that the average speed of vehicles around the flashing bus stops had reduced significantly, although no further description or data is presented. It is not clear whether these data are the same as those recorded in the Swedish SeeMe® trial or are new data measured in the trial of the Smart Safe School

Bus system. Nevertheless, the authors conclude that while the system would have obvious up-front costs associated with it, a cost-benefit analysis determined that the expected casualty savings would result in a benefit at a societal level.

The smart-safe school bus system has fed into the European study Safeway2school, a project exploring the development of a standardised Intelligent Transport System for use on school buses. More detail about the project is presented in section 6.8 on page 75.

6.4.3 School transport drivers

6.4.3.1 Bus drivers

It is generally accepted that bus drivers operate in a stressful work environment (Evans & Carrere, 1991). They need to adhere to schedules, drive in heavily congested traffic, carry responsibility for their passengers and provide good customer service. For school bus drivers these responsibilities are arguably heightened due to the nature of the journey and the passengers. For example, by not keeping to schedule children are put at extra risk by waiting at the roadside, often where there is no designated bus stop or safety features; the morning school journey takes place in heavily congested rush hour traffic; and the driver is responsible for young children who are seated behind them and with whom they may not be comfortable interacting with and controlling. Nevertheless, it is expected that school bus drivers drive safely, ensuring pupils wear seat belts, behave appropriately and embark and disembark the vehicle safely.

With respect to driving safely, research has demonstrated that the established relationship between experience, age and crash risk for UK bus drivers follows a similar pattern to that of car drivers (Dorn & Wahlberg, 2008). Analysis revealed that experience had the strongest effect on crash risk in the first year of bus driving, while age has a u-shaped association with crash risk (i.e. younger and older drivers have more crashes) (Dorn & Wahlberg, 2008). However, bus driving experience is found to be more important than age, especially in the first two to three years, but up to five (Wahlberg, 2005). These results are unsurprising given the established knowledge of age and experience effects on car drivers' crash risk (Maycock, 2002). To ensure that school bus drivers are operating at minimum levels of crash risk, local authorities should consider stipulating a minimum period of three to five years of bus driving experience for drivers operating school buses, possibly in addition to a minimum age range for drivers. It is also suggested that more female drivers are recruited as females generally have a lower crash risk than males (Flahaut, 2003).

Further training could also be provided to drivers with the aim of reducing their risk of crashing. Elvik and Vaa (2004) report that training professional drivers in 'defensive driving' can reduce their accident rate by up to 20%. However it should be noted that this was based on a course given to experienced drivers, and that some approaches to driver training and education have been shown to be relatively ineffective; often such interventions are not evaluated properly (see Helman, Grayson & Parkes, 2010 for a review). Any training interventions should be thoroughly researched and based on a formal body of knowledge, and preferably have existing evaluation data demonstrating safety benefits.

Some local authority areas have reported providing guidance or training to bus drivers who transport children on the school run; although many of these are aimed at bullying prevention and pupil behaviour. Soerensen *et al*. (2002) note that drivers are key to achieving increases in safety as they are the experts of real-life conditions. They suggest that drivers should be more involved in transport planning and training pupils in safe behaviours around the school bus. School bus drivers could be trained to:

- Engage more with pupils to improve safety
- Risk assess the route and pick-up and drop-off points

- Control Intelligent Transport Systems to communicate with parents and schools.

Bus driver training is often the responsibility of bus operators and recently there has been increased interest in the use of simulators for the training of professional drivers including bus drivers. The Association of German Transport Undertakings (2008), for example, recommends the use of bus simulators for the training of:

- Fuel efficient and environmentally friendly driving styles
- Dealing with malfunctions
- Safe and defensive driving styles in an interactive traffic environment
- Customer service.

Driving simulators are considered to be a valuable training tool as they allow drivers to practise in a controlled and safe environment. Their use is likely to further increase as a result of the introduction of the EU's training directive in September 2008 (2007/59/EC) which allows Passenger Carrying Vehicles (PCV) drivers to do some of their initial training and periodic training (35 hours of training every five years) on a 'top of the range' simulator. 'Top of the range simulator' has not yet been defined by the European Commission. However, this specification is likely to be functional rather than technical; potentially linked to measurable performance benefits from simulator training.

Simulator based training should be guided by the training needs of the drivers. Training scenarios should be based on an analysis of tasks that drivers will encounter and have to deal with in the real world (Neukum *et al*., 2003; Rheinberg-Schueller, 2009).

While simulator based training may currently be too expensive to smaller operators, the notion of requesting that operators engage their drivers in further training and responsibilities should be considered, where such training is known to increase safety.

6.4.3.2 Other drivers

As noted above, the relationship between driver age, experience and crash risk is well established (Maycock, 2002). It is therefore important that authorities set conditions for drivers of taxis and minibuses to have minimum age and experience requirements. Research would suggest that to reduce risk drivers should be at least 25 years old and have at least three years of active driving experience. Local authorities should stipulate these requirements when pupils are collected by car or minibus. In addition, there should also be a requirement for the driver of these vehicles to ensure that seat belts are worn by all pupils being transported.

6.4.4 Seat belts

Ever since seat belts were first introduced in the UK, a lot of effort has been directed at persuading people to wear them. It is widely accepted that many more lives would be saved and serious injuries prevented if more people used their seat belts when travelling in vehicles.

Analysis by TRL of in-depth accident studies (CCIS) and the national STATS19 accident databases has shown that seat belts are effective at preventing fatal and serious injuries, and that there is a huge potential benefit of raising seat belt wearing rates in the UK. Seat belts were found to be about 60 % effective at preventing fatal injuries, and about 32 % effective at preventing serious injuries for car occupants (Cuerden, 1997, 2006). If everyone in the UK wore a seat belt, it is estimated that over 150 lives and 400 serious car occupant casualties alone could be saved every year. (Richards *et al*. 2008).

Transporting children in cars, mini buses or larger coaches presents additional challenges compared to adults as it is very important to ensure that the seat belt or child restraint

used is appropriate for their height and weight. This is especially true for children under 12 years.

Seat belt effectiveness is not universal; there can be considerable variation with respect to the performance of a given system at mitigating injury. Some factors which influence effectiveness are outlined below:

- Vehicle type, passenger car, mini bus, coach etc.
- Age, gender and health of passenger
- Type of restraint system available, from simple seat belt to advanced seat belt systems which minimise the occupant loading during the crash. Modern cars provide frontal impact passenger airbags, which for people over 150cm tall help manage the impact forces, lowering the seat belt induced loads
- Type and severity of impact.

In general seat belts or child restraint systems are more effective in passenger cars than larger vehicles, simply because the average crash experienced by a larger vehicle is normally less severe due to the effect of their mass. For this reason the NHTSA (2002) concluded that the addition of lap belts on dedicated yellow school bus fleets would have a minimal safety benefit; although seat belts on smaller transport was considered effective. It is important to consider that the NHTSA (2002) study was analysing the benefits of seat belts on North American school buses that have reinforced safety structures including a compartmentalised design.

Seat belts are effective in all vehicles, especially for frontal impacts and rollovers and the best practice should always be to wear them when they are available. Where there is a choice over the type of vehicle to use, ones fitted with seat belts, ideally three-point lap and diagonal automatic retractor ones should be used.

6.4.4.1 Transporting children in wheelchairs

The safety of children who remain seated in wheelchairs when travelling on school transport poses a number of issues for local authorities and transport operators. The Department for Transport commissioned TRL to investigate the safety of children in wheelchairs travelling in road passenger vehicles and the full report can be downloaded for free from the TRL website:

http://www.trl.co.uk/online_store/reports_publications/trl_reports/cat_vehicle_engineering/report_The_safety_of_child_wheelchair_occupants_in_road_passenger_vehicles.htm

The study established that children in wheelchairs do not generally receive the same level of protection as that of children seated in vehicle seats. Children in wheelchairs must be afforded enough space on a vehicle to reduce the risk of their head striking the interior of the vehicle in the event of a collision. A head and back restraint should be provided for children in wheelchairs, irrespective of the direction they will be facing in the vehicle. It is important that children in wheelchairs are afforded at least a three-point seat belt where a specific wheelchair restraint system is not available. For best practice the reader is directed to the above mentioned report.

6.5 International school bus safety practice

6.5.1 Australian National School Bus Safety Action Plan

In 2001, Australia developed a National School Bus Safety Action Plan (Austroads, 2001) which outlined short, medium and long term goals for improving school bus safety. The action plan focuses on specific issues relating to education, enforcement, bus design and future research needs. The most important aspect, however, was the establishment of a School Bus Safety Advisory Group to oversee the development and maintenance of

school bus safety issues in Australia. In addition, a National School Bus Safety Expert Working Group was established to work under the Advisory Group to keep track of progress within individual jurisdictions, and refine and prioritise actions within the plan.

6.5.2 Yellow buses

Canada and America have dedicated school bus fleets, painted in a distinctive yellow livery, and use of such a fleet appears to influence the number and type of casualties. Hildebrand (2001) conducted analysis that compared Canadian, American and Australian casualty data related to school bus transportation. While school bus occupant fatalities are low in all countries, this is particularly true in America where buses are reinforced to protect occupants; a design feature termed 'compartmentalisation'. However, there are a disproportionate number of casualties as a result of pupils being hit by the bus they are embarking or alighting from in America, which has been partly attributed to the long nose design of some yellow buses (NHTSA, 1997).

A further example of differences in collision type is apparent when it is considered that a significant number of school bus related fatalities in Canada and America are occupants of other vehicles whereas in Australia (and Scotland), the majority of school bus related fatalities are as pedestrians upon alighting from the vehicle. In fact, it was found that children were three times more likely to be struck as a pedestrian following alighting from a bus in Australia than in Canada or America. It could be assumed that a similar ratio would apply to Scotland. Hildebrand (2001) argues that the boarding and alighting procedures in America and Canada, involving flashing lights, stop boards and illegal passing laws, help to prevent pupils being struck by other motorists. There have been calls for a dedicated school transport fleet in the UK, although it is possible that some of the safety benefits can be achieved without specifically having a dedicated fleet.

The Yellow School Bus (YSB) Commission was established by FirstGroup plc to examine and quantify the environmental, social, educational and economic costs of using a nationwide network of dedicated home to school transport. A YSB Commission (2008) report details a cost-benefit analysis of the implementation of a dedicated fleet of school transport. The key benefits to safety involve the following:

- **Vehicle**
    - Construction strength.
    - Three-point seat belts for each seat.
    - Padded seats.
    - Luggage racks.
    - Interlocking doors and emergency exits when the vehicle is in motion.
    - CCTV and reversing assist camera.
    - High visibility yellow colour distinguishes school bus to other motorists.
- **Driver**
    - CRB/Enhanced Disclosure Scotland checked.
    - Dedicated school bus drivers can be specifically trained for the role including: accident and breakdown procedures; pupil management; bullying management.
    - Professional appearance as same driver(s) consistently used.
    - Can build rapport with parents and pupils.
- **Routes**
    - Guaranteed seats for all pupils.

- Pick-up and Drop-off points reasonably close to home.
- Not available to wider public.
- Evacuation drills.

- **Safety related cost savings**
  - Societal costs savings due to reduced risk based on the transfer of pupils from car travel or walking to bus transport.
  - Expected reduction in casualty rate and associated costs.

A DfT (2009) response to the recommendations of the YSB Commission report acknowledged that the dedicated YSB scheme had benefits, some safety related, and was suitable in certain areas, but questioned the 'optimistic' financial projections.

The Sutton Trust (2005) report on Yellow Buses provides some information with regard to the safety benefits of yellow buses but this mainly consists of comparison with other transport modes. As is seen in section 3, bus travel is the safest form of transport to school hence increasing the number of pupils using bus travel would be expected to have a safety benefit; however this is not unique to yellow buses. Although there are trials and evaluations of yellow bus schemes throughout the UK, including Aberdeen, there does not appear to be a clear indication of expected casualty savings or the full safety impact as a result of the use of yellow school buses in the UK. The evaluations claim that the buses provide a perceived safety benefit to parents and pupils, which is sometimes a barrier to traditional school bus use (YSB Commission, 2008).

The principles of the yellow school bus system have the potential for improving safety. The comparison of international data from Australia, Canada and USA would suggest that the yellow school bus system might address high risk situations, like pupils alighting from buses. However, it is not clear whether the safety benefit is due to the increased conspicuity of the school buses or the law that prevents other motorists from overtaking a stationary bus.

It would appear that a dedicated school bus system may be appropriate in certain circumstances where costs support implementation. A large increase of pupils using the school bus is likely to decrease overall risk and improve safety, however, much of this safety improvement could be attained without the need for a dedicated yellow bus fleet. Aside from the strengthened chassis and design of yellow buses, traditional school bus provision could be improved by implementing key characteristics of the yellow bus scheme. Key characteristics that could be applied to traditional bus fleets used for school transport can be seen in Table 6-2.

Table 6-2: Key safety characteristics of the yellow bus scheme

Key Yellow Bus Characteristics	Safety Benefit
Better communication between local authorities, transport operators, schools, parents and pupils regarding the provision of transport, timing, safety and behaviour.	Increase take up of school bus use leading to a lowering of overall risk.
School contracts insisting on 3-point seat belts for each pupil.	Increased pupil safety in the event of a collision.
CCTV fitted to all vehicles	Improve pupil behaviour on buses and to increase perceived safety for parents and pupils.
School bus conspicuity increased by use of larger school bus signs and correct use of hazard warning lights.	Increase awareness of other drivers to the potential of pupils crossing around the area of the bus
Driver training and responsibility to improve interaction with pupils and parents and be aware of dangers for pupils.	Increased management and detection of dangers to pupil safety.
Driver recruitment to ensure drivers are commonly used for certain routes to build rapport with parents and children and understand local safety issues (i.e. pick-up and drop-off dangers)	Drivers can learn of local danger spots on the route, especially around pick-up and drop-off areas where pupils are most at risk. Regular contact with parents and pupils could allow the driver to inform them, and route managers, of any dangers and near misses perceived.
Ensure all drivers are Enhanced Disclosure Scotland checked.	Checks that drivers and escorts are legally suitable for working with children.
Evaluation of pick-up and drop-off points to ensure they are as close to home as possible.	Evaluation of pick-up and drop-off areas can identify potential hazards and dangers for pupils when embarking or alighting from the vehicle.

6.6 Walking and cycling to school

Walking and cycling to school has many documented benefits to improve physical and mental health for children and is encouraged in Scotland's Road Safety Framework to 2020. However, walking and cycling to school are also the riskiest modes by which a pupil can travel to school, as the analysis in section 3 demonstrated. It is, therefore, imperative that safety for walking and cycling is improved if casualties are to be reduced in line with the 2020 targets, especially if greater use of these modes it to be encouraged.

Due to previous demand for safer walking and cycling routes to school, and to encourage parents and pupils that it is a safe alternative to the car, School Travel Plans, Safer Routes to School, and education and training have all sought to improve child safety when walking or cycling to school.

Safer Routes to School Guidance was made available to local authorities across Scotland and most have taken up the initiative in some form (Skellington-Orr *et al*., 2007). Whether as part of the Safer Routes initiative or independently run, education and training has also been used as a tool in an attempt to reduce casualty risk to pupils walking or cycling to school.

This section reviews School Travel Plans and Safer Routes to School as well as the use of education and training. Road user conspicuity and cycle helmets are also discussed.

6.6.1 School Travel Plans (STPs) and Safer Routes to School (SRTS)

School Travel Plans (STPs) and Safer Routes to School (SRTS) aim to make journeys to school safer and to encourage healthier, active travel. It is generally accepted that they aim to:

- Encourage people to think about travel to school
- Map common school routes and identify problems and barriers for their use
- Improve road skills and awareness of school children
- Encourage local authorities and community partners, police, schools, transport operators, parents and pupils to engage with each other to create safer school routes that can promote active travel.

Implementing an STP or SRTS program usually involves a school or local authority taking primary responsibility and leading a series of initiatives, supported by other members of a team of representatives. Initiatives can involve education, encouragement, engineering and enforcement initiatives. For example, creating a safety zone around schools may involve educating parents and pupils about the school journey, encouraging parents and pupils to consider their mode of transport for the journey, the installation of safe crossings or traffic calming measures, and the setting of a 20 mph zone.

The Scottish School Travel Advisory Group (SSTAG) note that the provision of infrastructure and facilities that increase walking, cycling or the use of public transport to school is the responsibility of local authorities (SSTAG, 2003). Within the same report it is suggested that STPs become an integral part of local transport strategies and that there is a need for different departments—for example, transport, health, and education—to work together. It is further noted that all schools should have a School Travel Team that involves members of staff, parents, pupils, school travel co-ordinators, active schools co-ordinators and Road Safety Officers (RSOs). Local authorities should engage closely with School Travel Teams so that actions are co-ordinated. It is suggested that local authorities develop a code of practice that outlines the responsibilities of all those involved in school travel including the authority itself, transport operators, parents, pupils and school travel teams (SSTAG, 2003).

6.6.2 What makes an STP or SRTS program successful?

Newson *et al*. (2010) established key factors that make school travel plans successful and what the benefits of school travel plans are. The report identified thirty good practice case studies in England and established that all had benefited from:

- A positive relationship between the school travel team and the local authority
- A head teacher that was supportive of the work
- Sustained travel initiatives of over two years or more
- A significant level of awareness-raising work
- Leadership from a champion and/or working group.

It was further noted that over half of the case study schools had benefited from extensive safety measures and improvements in the surrounding area. The increased safety was important in increasing active travel, particularly for secondary schools where pupils engaged in more independent travel. At primary school level, increased safety measures were considered important foundations for further initiatives.

Increases in cycling were particularly related to the presence of off-road cycle lanes and cycle parking at the school. All of the top schools for cycling provided these facilities and many were complemented by other safety measures such as traffic calming, lower speed limits, and on-road provision for cyclists. At primary level, schools achieving higher cycling levels also offered on-road cycle training.

One of the key messages from this work was how the support of local authorities was vital to successful initiatives, modal shift and safety. Authorities could provide supportive advisors, generate interest and excitement by leading publicity campaigns, and manage steering groups. However, many of the case study schools had also benefited from independent measures put in place by authorities such as controlled crossings, traffic calming, speed limit reductions and foot path improvements. Interestingly, many of the schools were not aware of the plans for these measures before their installation.

6.6.3 Do STPs and SRTS programs improve safety?

While STPs and SRTS programs can be used successfully to develop active travel, as measured by the number of pupils walking or cycling to school, there is an assumption that they are also increasing safety. Both walking and cycling have higher risk per journey than car and bus travel hence it is imperative that the effect on safety is considered. Newson *et al*. (2010) found anecdotal evidence that the majority of schools considered the surrounding area had become safer since establishing a school travel plan. Some schools noted that they believe the work had maintained their zero accident record. Where an initiative is introduced to an area with a base level of zero, it is impossible to establish a safety benefit from the implementation of a school travel plan; nevertheless this anecdotal evidence suggests that there has been no disbenefit, which is important. Authorities reported that they had difficulty measuring the impact of school travel plans on road safety although some reported accident and casualty data which suggested that school travel plans had improved safety (Newson *et al*., 2010).

A Scottish Executive (2002) review of research on school travel found it surprising that the impacts of initiatives to change travel behaviour have been poorly researched. There are a variety of likely reasons for the lack of evaluation work. There may be an assumption that by simply introducing a safety initiative, that school travel will become safer, hence there is no need for evaluation. Where evaluation is considered, it may be too costly; many initiatives involve a combination of approaches and would require a large sample and comparison groups to provide valid measures. There is a further difficulty when considering how to measure 'safety'. Safety measured as casualty numbers is difficult as the incidence of casualties specific to school travel is usually low at school or authority level which makes establishing significant differences from before and after data extremely difficult, unless very long timeframes are used. Given these difficulties, safety can sometimes be found to have been measured as 'perceived safety' by parents or pupils. Perceived safety does not necessarily have any relationship with actual safety, hence the results of these types of evaluations can only be used to indicate confidence levels rather than safety benefits.

In an unpublished report of travel plan case studies in England, Cairns *et al*. (2006) established that safety was often one of the primary reasons for implementing travel plans. In evaluating travel plans in England, twenty-three schools (77% of the sample) indicated that they thought parents perceived that travel to school had become safer; one school felt that parents considered that school travel had become less safe, possibly due to the school highlighting dangers to the parents.

Cairns *et al*. (2006) asked local authorities what evaluation work they had performed. Some authorities reported that it was too early to tell at the time, while others commented that they would be monitoring the Stats 19 database, although admitted that with so few incidents it would be difficult to establish any meaningful conclusions. Two authorities stated that they based their approach on 'danger reduction' rather than accident reduction. Three local authorities believed that their school travel planning had improved safety although they did not have data to support that claim.

Some local authorities did have data to evaluate their travel plans. One authority compared the total number of child casualties on the journey to and from school for a period of two years prior to intervention and two years after. The data showed that there had been a 25% reduction in all casualties (from 461 to 348) including an 18% reduction

in pedestrian casualties (from 196 to 161), a 34% reduction in cycle casualties (from 53 to 35) and a 17% reduction in car passenger casualties (from 140 to 116) (Cairns *et al*. 2010). It is not known whether these data have been compared to a comparison area or whether trends over time have been controlled for; either one of these measures is desirable in evaluation so that we can be confident that any changes observed are actually due to the intervention.

Other local authorities also reported reductions in the total number of casualties on the school journey, or within 200m of the school gate, and that they consider school travel plans to have played some part in this reduction (Cairns *et al*., 2006). A further authority reported no change in casualty data although there had been an increase in pupils walking to school.

A large safer routes to school programme in Odense, Denmark was evaluated in 2002 (EU-target.net, 2003). The safer routes to school programme in Odense covered 45 schools and 104 of the projects around these schools were evaluated. The evaluation compared before and after accident data which controlled for trends from non-treatment areas which had similar levels of population growth and urbanisation. The evaluation found that there was an 18% reduction in accidents and a 20% reduction in casualties as a result of the programme. It is reported that the effects were mainly due to speed reduction measures such as low speed limits, traffic calming, raised intersections and various types of signage to warn drivers.

Installing speed reduction measures has also been reported to be a key factor in reducing casualties in three English authority areas, although the means of evaluation are unclear (Cairns *et al*., 2006). It was claimed that traffic calming measures in one had reduced child casualties by 76%; 20 mph zones are believed to have reduced casualties by 74% in another; and a reduction of 24% over a five year period was reported for another area that introduced speed management and speed reduction measures.

However, the Odense evaluation (EU-target.net, 2003) also found that half of the interventions had made travel to school *less* safe. Interventions that were found to decrease safety mainly involved cycle paths, although in some places where cycle paths had been installed safety had improved. This suggests that installing a cycle path to encourage cycling has to be carefully considered so as not to increase the risk to pupils travelling to school. Any installation and promotion of cycle paths should also be evaluated and monitored to ensure that risk has not been increased for pupils travelling to and from school. One of the reasons for mixed results may be due to the number of cyclists using the route as it is argued that as the number of cyclists increase on a route so does cycle safety, due to a form of group effect (Elvik, 2009).

6.6.4 School zones

One certainty for the consideration of school transport safety is that pupils will congregate towards the school in the morning and dissipate from it in the afternoon. During these times buses, cars, cyclists and pedestrians converge to provide a complex and challenging environment around the school. Without management, pupils within the area around the school at these times can be at increased risk. Creating a 'safe school zone' around the school where traffic is managed, clear drop-off areas are defined and low speed limits are in place will reduce the risk of collisions between pupils and traffic.

The majority of local authorities in Scotland have introduced 20 mph areas around schools and many have also used their right to control traffic through Traffic Regulation Orders. Research supports the implementation of 20 mph zones and speed reduction measures around schools. Burns *et al*. (2002) evaluated the effects of a 20 mph initiative in Scotland and concluded that it reduced average traffic speed and both the number and severity of recorded accidents. Similarly, Ross Silcock Limited (1999) examined the impact of traffic calming schemes and found that they reduced the

average speed of traffic and improved the perception of safety for pedestrians and cyclists.

In Australia, Queensland Transport trialled the installation of flashing lights in three school zone locations (King, 1999). The school zones selected for the trial had been identified to have safety problems that were not easily remedied. The trial consisted of the installation of two yellow flashing lights used in conjunction with school zone signs at both entries to the school zone. The flashing lights operate during the times specified on the school zone sign to alert motorists to the presence of a school bus and to the likely presence of children. To determine whether the flashing lights resulted in reduced speed, speed surveys were conducted prior to the installation of the flashing lights, one week after, one month after and six months after their installation. Overall, average vehicle speed reduced significantly for all sites one week and one month following commencement of the trial although speeds were still higher than the 40km/h limit at these sites. The authors report a small rebound effect after six months, although the average speeds recorded for each site remained lower than the average speed prior to the introduction of the signs (King, 1999). A list of possible initiatives to improve safety within the 'school zone' can be seen in Table 6-3.

Table 6-3: Possible interventions around the school zone and the potential safety benefit.

School Zone Intervention	Safety Benefit
20 mph zone	Has been shown to reduce average speed and the number and severity of casualties (Burns *et al*., 2002).
School zone warning signs/flashing signs	Raises awareness to other motorists of the likelihood of children crossing near the school. King (1999) found average speed reduction to be maintained 6 months after installation.
Parking warning signs	Prevents parents and carers from stopping immediately outside the school entrance. Prevents congestion and the 'masking' of pupils.
Zig Zag lines	Commonly seen outside schools to prevent parents and carers from stopping immediately outside the school entrance.
Dedicated drop-off areas	Dedicated lay-bys or alternative dropping areas away from the main school entrance can help manage traffic congestion.
Traffic calming	Traffic calming has been shown to reduce average speeds as part of STPs and SRTS programs, cited as an important element for improving safety (EU-target.net, 2003).
Crossings	The introduction of crossings near pedestrian desire lines can improve the management of pedestrian behaviour and control traffic.
Raising awareness	Parents and pupils can be informed of the procedures in place within the school zone to improve safety.
Enforcement	If necessary, enforcement can be used to provide a deterrent to behaviours that are considered to compromise safety within the school zone.

6.6.5 Education and training

A number of safety schemes related to school transport will use some form of road safety education or training. Before discussing some specific schemes, it is worth considering the issue of education and training at a general level, since currently there is a great deal of debate about the effectiveness of such interventions, and more importantly how this effectiveness can be demonstrated[5].

Road safety education and training has a high level of acceptance by both practitioners and by the public as an effective way to bring about road safety improvements. However, more recently the wisdom of this point of view has been questioned by a number of authors, particularly in road safety (e.g. Helman *et al*., 2010) but also in wider healthcare settings (e.g. McKenna, 2010). In short, when systematic reviews[6] of the effectiveness of educational or training interventions are consulted, the evidence is very poor with respect to improved outcomes on key health indicators (for example road deaths, or deaths due to other key public health behaviours such as smoking). This is especially true for driver training and education for new drivers; Helman *et al*. (2010) is the latest in a series of reviews to conclude that driver training and education, as it has been delivered in the past, has no detectable road safety benefit (see also Clinton & Lonero, 2006; Mayhew *et al*., 2002; Roberts & Kwan, 2001; Christie, 2001; Vernick *et al*., 1999; Brown *et al*., 1987). Helman *et al*. (2010) argue that the reason for this, broadly speaking, is that driver training and education in its current 'low dose' form (typically a few dozen hours of supervised driving in the UK), and focused on vehicle control skills rather than higher level skills such as Hazard Perception (although see Wells *et al.*, 2008) is not able to replace the post-test on-road experience that does reduce collision risk in new drivers (e.g. McCart *et al.*, 2003; Kinnear *et al.*, 2009; see also Gregersen *et al*., 2000 for an example of how very large amounts of pre-test experience can lead to apparent safety benefits).

McKenna (2010) goes further, and suggests that when looking at the key health outcome variables, educational approaches across multiple healthcare settings are found lacking in terms of robust evidence for effectiveness. While programmes centred on minimising exposure to risk (such as graduated driver licensing systems) or utilising legislation to change behaviour (such as the indoor smoking ban and seat belt laws in the UK) tend to demonstrate robust effects in terms of injury reduction and improved health outcomes, programmes relying solely on education and training typically have been shown to be either minimally effective, ineffective, or even capable of leading to adverse impacts. This final point is crucial; there are numerous examples of well-intentioned educational interventions across healthcare—a number of them in road safety—that have, due to mechanisms that are well researched and understood by experts in human behaviour, done harm rather than good. Often these mechanisms do not make intuitive sense. For example, practitioners may assume that the risks associated with a particular behaviour (e.g. speeding) will always be perceived as negative in value, however, it has been demonstrated in a number of studies that often some people can view such risks as positive in value. Therefore interventions that merely seek to 'raise awareness' of the risks (intuitively a good thing to do to encourage better behaviour) may lead some people to be attracted (rather than repelled) from taking part in the behaviour. If the intervention is also ineffective at changing behaviour 'for the better' in those individuals who do view risk as bad (perhaps because it fails to engage properly with those audiences) then overall, negative outcomes can result.

The point here is not that road safety training and education can never be effective; rather, better evaluation of the effectiveness of educational interventions against their

[5] Actually, the call for better evaluation in road safety is ubiquitous; all types of intervention require better evaluation data, so that what works, and what does not work, and why, can be known.

[6] Systematic reviews in healthcare aim to assess the quality of research evidence on a given topic (for example the use of randomised control trials and control groups) so that a 'big picture' view of the strength of the evidence base can be established. They are generally accepted as being the benchmark method for establishing effectiveness.

intended outcomes is essential if we are to establish what is effective, in what doses, and in what circumstances. If possible, evaluation should be against the direct health outcomes being targeted (for example, fewer collisions between cars and school children) but lacking this it should at least be against the observable behaviours being targeted (for example vehicle speeds, seat-belt wearing, or road crossing at appropriate places). School transport safety interventions are no different; educational approaches to road safety in the school transport context will need to be evaluated effectively if we are to establish what works, and what doesn't, in improving safety for school pupils on their way to and from school.

It is also important that educational campaigns are precisely defined in terms of their dosage, methods of delivery, and other factors that may impact on their effectiveness. Again there is a tendency to expect that delivery of some basic information, or perhaps the delivery of well-crafted media that 'shocks' or 'makes people think' will suffice in changing behaviour. Time and again in research into behavioural change this has been shown not to be true. As such, when evaluation data are available on a particular intervention, the extent to which they rely on particular doses or approaches should be established if possible. It is better to deliver something well, in a limited number of schools (perhaps the ones with the most risk) than to deliver it badly in all schools. To illustrate this point, we consider the Kerbcraft intervention.

6.6.5.1 Kerbcraft

Kerbcraft is a good example of an education or training scheme that has been properly evaluated, both in terms of 'outcome' variables (behavioural change, cost effectiveness) and in terms of 'process' variables such as its impacts on the organisations using it (schools) and its sustainability. Kerbcraft is designed to teach pedestrian skills to 5–7 year-old children through practical training at the roadside. A number of local authorities in Scotland have already participated in Kerbcraft according to the Skellington-Orr *et al*. (2007) survey and this has helped bring pedestrian training into the curriculum. Whelan *et al*. (2008) showed that Kerbcraft training delivered during the pilot scheme period between 2002 and 2007 resulted in changes in observable behaviours related to safe crossing (choosing a safe place, crossing safely when parked cars are present, and crossing safely near junctions) in trained children, relative to a matched control group of children who had not had the training. These differences were observable two to four months after the training. These findings are impressive, and they demonstrate that the Kerbcraft intervention, delivered in the way it was in the study, works at changing key outcome behaviours. However it is worth noting that follow-up surveys showed that even though the majority (69%) of authorities were continuing with some Kerbcraft training, very few had continued to use the recommended number of sessions focusing on each of the skills (four to six 'Safe Places' sessions; four 'Parked Cars' sessions; and four to six 'Junctions' sessions.) This is unfortunate, as the evidence reported by Whelan *et al*. (2008) can only be used as justification for effectiveness if recommended number of sessions are taught, and if it is ensured that the other variables covered in the evaluation (for example the importance of competent trainers) are kept constant. In addition, the authors point out that further work is needed to establish the longer term effects of the training, to assess when refresher training might be required.

6.6.5.2 Road Safety Scotland

Road Safety Scotland has been developing educational resources that fit within an overarching strategy for road safety education in Scotland, providing active learning at every level. The resources are designed for young people aged 3–18 years and are delivered by teachers in all education settings from Early Years to Senior Phase including Special Schools and FE Colleges. Key road safety messages are explored in greater depth as children and young people develop throughout their education. The educational resources are designed to comply with the Experiences and Outcomes within the

Curriculum for Excellence, the Scottish Government's framework for learning. Road Safety Scotland have also identified a range of links across learning to Literacy, Numeracy and Health and Wellbeing.

As part of the approach to learning, safe road user behaviour is set in the context of situations that are common to young people. For example, the Streetsense resource used in Primary school includes activities that encourage parents to get involved in road safety education and explore and plan a safe route to school with their child.

Road Safety Scotland has evaluated many of the resources in terms of how they have been distributed by local authorities and road safety officers, how schools use the resource and to identify ways in which the resource can be sustained and developed. The resources are provided free of charge to all schools in Scotland.

The resources therefore provide the potential for a consistent approach to general road safety education across Scotland rather than as a targeted intervention towards a single specific behaviour.

6.6.5.3 Educational material relating to school buses

There are few resources available that specifically target the issue of safety around school buses. In 2009, Aberdeenshire Council with support from Talisman Energy (UK) developed the Bus Stop! Education Pack to address the situation when a pupil alighting from school transport may be distracted and placed at risk. The pack includes a short film entitled '1Second.1Life' and has been rolled out in schools across Aberdeenshire, Aberdeen City and Moray.

In 2010, the authority in partnership with fellow North East Councils and Road Safety Grampian sought to extend the campaign to raise awareness of school bus safety to all stakeholders, including motorists, parents as well as pupils, through the development of a local television advertising campaign based on the '1Second.1Life' film. A website has also been prepared to support the messages promoted in the advert. A range of in-class activities and pupil promotions including school bus posters' competitions and road safety magic shows are also used as part of the campaign.

To date the campaign has not been evaluated against its desired outcomes and it is recommended that this is done before being implemented elsewhere. As noted above, with any intervention it is essential to determine that it is doing no harm (e.g. promoting social norms of bad behaviour around school buses) and to establish that it is effective at improving safety through raising awareness resulting in behavioural change (e.g. fewer pupils being distracted when crossing and slower speeds when motorists are passing school buses).

Further information about the campaign is available at www.1second1life.co.uk.

6.6.5.4 On-road cycle training

The Scottish Cycle Training Scheme (SCTS) is a resource toolkit which is used by partnerships created between primary schools, local road safety officers and volunteer trainers to deliver cycle training. The trainers may be teachers, learning support staff, parents or Active Schools co-ordinators. Cycling Scotland has information on training courses for cycle trainers who then cascade training down to other volunteer trainers.

The SCTS is an important child cycle training resource in Scottish primary schools. The intention is to reduce casualties while encouraging a healthier and environmentally sustainable method of travel. Pupils participating in this scheme develop basic skills and knowledge concerning the risks and responsibilities of cycling, rules of the road, and bicycle care and maintenance. Training can be delivered in an off-road environment, such as a school playground or car park, or on-road. Research has identified that on-road cycle training improves children's practical skills and knowledge of road safety (Savill *et al.*, 1996). Cycle training links into Scotland's Curriculum for Excellence

Programme and when delivered on-road meets with the UK National Standard for Cycle Training.

The take up of SCTS by schools varies throughout Scotland. Previous research suggests that while most schools would wish to offer cycle training, concerns about safety, availability of volunteer trainers or other resources, and environmental constraints form part of a reluctance to provide training (Scottish Executive, 2001). Nevertheless, on-road cycle training takes place in 74 of the 80 schools in Argyll and Bute. Road safety staff perform risk assessments of the on-road training sites prior to training commencing. Much like the success of Kerbcraft mentioned previously, it is considered that children learn more from the 'real world' experience of training on-road. Transport Scotland have commissioned case study research (due to be completed in early 2011) which is looking at the barriers that some primary schools face in delivering on-road cycle training, as well as examples of good practice.

Cycling Scotland's (2008) National Assessment of Local Authority Cycling Policy found that twenty-eight of the thirty-two local authorities had improved their cycling policies since 2005. However, evaluation of policy and demonstration of intervention benefits was reported as an area that required development. As noted previously, this is crucial if education and training interventions are to achieve their aims and demonstrate firstly that they do not inadvertently increase risk and secondly that they produce measurable safety benefits.

6.6.5.5 Cycling infrastructure

A new version of 'Cycling by Design' (2010) has recently been published by Transport Scotland and provides a comprehensive guide to contemporary examples of best practice in cycle route design. Its primary focus is the establishment of guidance for practitioners throughout Scotland to ensure consistent and appropriate design. Transport Scotland requires consultants and contractors working on trunk road projects to follow this guidance and suggests that local authorities developing cycle networks in Scotland adhere to the guidelines also.

6.6.6 Conspicuity

There is a large literature of pedestrian and cyclist conspicuity in traffic scenes; although the principles are also applicable to school crossing patrollers and workers or volunteers assisting with schemes such as the walking bus. A useful overview of pedestrian conspicuity research is provided by Langham and Moberly (2003). These authors point out that conspicuity is not simply determined by the visual characteristics of a stimulus (for example, whether or not a pedestrian is wearing a high-visibility vest), but is also dependent on a number of other factors such as the lighting and background against which a stimulus is viewed, and the goals and expectations of those viewing the scene.

An important distinction drawn in the conspicuity literature is between 'search' and 'attention' conspicuity. The former refers to how easy something is to detect if the viewer is deliberately searching for it, while the latter refers to how easily something 'grabs the attention' of a viewer who is not deliberately searching for it. Presumably because it is much easier to measure with certainty, almost all pedestrian conspicuity work has used 'search' conspicuity instructions, particularly when examining the effects of conspicuity aids such as high visibility vests (Langham & Moberly, 2003). Often such studies have reported large detection distances; for example Sayer and Mefford (2004) and Sayer and Buonarosa (2008) showed that moving pedestrians wearing high visibility vests were detected by drivers at distances of between 195m and over 300m depending on lighting and context. However, it is likely that the detection distances for pedestrians when drivers are not deliberately searching is much lower; for example unpublished data from a TRL track study, in which drivers commentated on various road scenes including road works with road worker mannequins wearing high visibility personal protective

equipment (PPE) has shown average detection distances of pedestrians under such conditions of between 30m and 60m at night, with significant numbers of drivers failing to mention the mannequins wearing PPE in their commentaries at all. Risk managers who are responsible for school transport safety would be advised to be careful in assuming too much effectiveness from high visibility clothing based on literature that has used search conspicuity instructions.

Although PPE is likely to be useful overall, it should also be noted that over-confidence on the part of the pedestrians wearing it is also likely to be a problem, especially at night. Tyrell *et al*. (2004) suggest a number of studies showing that pedestrians overestimate how visible they are, especially at night. Considering data from multiple studies, and multiple clothing conditions, the authors conclude that pedestrians overestimate their conspicuity by a factor of 1.8 times at night.

Tyrell *et al*. also discuss studies related to educating people as to the actual effects of different types of PPE (white clothing, high reflective vests, and high reflective outfits with reflective material at body extremities to encourage perception of 'biological motion') on levels of night time conspicuity. They show that a specific educational intervention does help to raise awareness of actual levels of conspicuity. They suggest instead that to maximise the chance of it being successful in changing behaviour, such education should help pedestrians to understand the actual mechanisms by which different type of PPE help increase their conspicuity. For example at night the key mechanism is believed to be the use of retro-reflective material.

6.6.7 Cycle helmets

Cycle helmet wearing rates have increased steadily since 1994 for most cyclist groups and in 2008 they were 34% on major roads and 17% on minor roads, up from 22% on major roads and from 8% on minor roads in 1999. However, since a review in 2002 (Towner *et al*., 2002) there has been much debate in the literature regarding the effectiveness of cycle helmets. Recent research by TRL for the Department for Transport sought to provide a comprehensive review of the evidence regarding the effectiveness of cycle helmets in preventing injury in the event of an on-the-road accident (Hynd *et al*., 2009).

The review involved evaluating the effectiveness of cycle helmets from various perspectives including cycle helmet testing, biomechanical limitations, a literature review, and an in-depth accident data investigation. The report concludes:

> "Assuming that they are a good fit and worn correctly, cycle helmets should be effective at reducing the risk of head injury, in particular cranium fracture, scalp injury and intracranial (brain) injury." (Hynd *et al*., 2009, p10)

Cycle helmets were considered to offer protection in a number of accident conditions including the most common simple accidents that often do not actually involve another vehicle and involve falls or tumbles over the handlebars. The report notes that cycle helmets are expected to be particularly effective for children because the European Standard (EN 1078) impact tests and requirements are the same for children as they are for adults. Because a child's head height is likely to be within the European test drop height there will be more instances where any accident impact is within tested boundaries and the helmet should perform well.

In light of the conclusions from this comprehensive review it is suggested that alongside encouraging active travel, authorities should encourage children to wear a helmet at all times when cycling, and insist that they do so when travelling as part of the school journey.

6.7 The car

Pupils who are driven to and from school by car are the responsibility of parents or carers and the driver of the vehicle, if different. Nevertheless, as part of creating a safe school zone, schools and authorities would be expected to provide safe areas for pupils to be dropped off and picked up by car. In addition, as part of safe school transport advice to parents, authorities can raise awareness of basic safety principles that will help to reinforce good behaviours like ensuring everyone in the vehicle is wearing a seat belt (see section 6.4.4 on page 60). As detailed in section 3 using the school bus is safer than going by car and authorities may wish to communicate this to parents and carers as there is evidence that they perceive the opposite to be true (Sonkin *et al*., 2006).

Previous sections have discussed raising awareness of pupils to drivers but it is also worth noting that a particular group of drivers is at increased risk of being crash involved and are likely to be common around schools—young novice drivers.

6.7.1 Young novice drivers

Obviously only pupils who are still at school aged 17 will be able to drive a car to and from school, however, young drivers who have left school may have siblings or friends that they take-to or pick-up from school. It is necessary to consider this group of drivers as young drivers are over-represented in car crashes in Scotland and the UK (DfT, 2010).

The crash risk of a seventeen year-old novice driver reduces by forty-three percent after their first year of licensed driving (Forsyth *et al*., 1995); one in five newly licensed drivers will be involved in a crash within their first year (Maycock & Forsyth, 1997). This demonstrates the increased risk that novice drivers pose to themselves and other road users.

Given that young drivers are also novice drivers, this would imply that the common denominator of crash risk is either age or inexperience, or both. While age and gender both influence crash risk (risk typically reduces with age and females are at lower risk than males) it is the role of inexperience that is seen as the most important contributory factor in the first few years of licensed driving (Maycock, 2002). Research now suggests that drivers typically require at least 1,000 miles of solo driving experience for risk to reduce towards the level of experienced drivers (Kinnear *et al*., 2009; McCartt *et al*., 2003). Inexperienced drivers have been shown to demonstrate poor hazard perception skills that are thought to underpin their increased crash risk (Deery, 1999).

Many other age and inexperience related factors also underpin young, novice driver crash risk (see Deery, 1999), including social influences. The school setting, therefore, provides a social setting where young novice drivers, influenced by the presence of peers (see Chen *et al*. 2000), also have to respond to an array of hazards (e.g. passing school buses and pupils as pedestrians and cyclists) for which they are not experienced enough to fully appreciate. In this context young novice drivers around the school can be considered as a risk. In addition, a reliance on a young novice driver to take pupils (e.g. younger siblings) to and from school would represent an increased journey risk and parents should be discouraged from allowing a young novice driver to do so. Analysis of Scottish road accident casualty data supports this recommendation as more than half of 15 year-old male car passenger casualties (19% of 15 year-old female car passengers) occur when being driven by a 17-20 year-old driver (Scottish Government, 2008a).

While the risk of young drivers on the school journey is not traditionally cited or reported in the UK, evidence from America supports the notion that teenage drivers are at greater risk than experienced drivers when driving to and from school. There are some obvious cultural and geographical differences between the USA and Scotland that impact on the transport modes used to get to and from school (e.g. average journey lengths are longer and car use is more common by pupils in the USA) but it remains noteworthy that passenger vehicles with teen drivers account for over half of the annual average 815

student deaths and 152,250 injuries related to school travel during normal school travel hours, as reported by the American Academy of Pediatrics (2007). Other research has noted that passengers in cars on the school journey driven by teenage drivers are less likely to wear their seatbelt than passengers in cars with adult drivers (Williams *et al.*, 2010). This research in conjunction with other well established general young driver research in the UK suggests that it is reasonable to consider the young novice driver to increase the risk to themselves and others on the school journey.

To reduce this risk, young novice drivers should be discouraged from driving to or from school. Alternatively, parents or other adults could be encouraged to travel with and supervise young novice drivers as this is known to reduce the risk of collision significantly, whilst providing the novice driver with valuable experience (Forsyth *et al*., 1995).

6.8 Ongoing research

6.8.1 SAFEWAY2SCHOOL

SAFEWAY2SCHOOL is a European research project that started in September 2009 and will run until September 2012. The project has 14 partner organisations and has received 3.7 million Euros of funding. The project aims are to:

- Develop optimal route planning for school buses, to guide them through areas of low traffic, avoiding black spots.
- Develop optimal real-time route guidance, taking into account dynamic traffic data, as well as the arrival and estimated arrival of children at the bus stops.
- Develop "intelligent" bus stops that understand the position of children and school buses and transmit relevant info and warnings to both actors.
- Develop a seamless, reliable and secure system of school bus position tracking and monitoring and a parents' notification system, when children are on-board the school bus.
- Integrate safety enhancement applications regarding speed monitoring and safety belt usage for the school bus, while travelling.
- Develop warning systems for surrounding vehicles on the existence of stopped school buses and/or children waiting/entering/exiting.
- Develop appropriate training schemes for school bus drivers, children, parents and all drivers, for optimal use of the developed systems and children safety enhancement in general.
- Performing socio-economic analysis, to identify the optimal business plans, legal schemes and organizational incentives for rapid adoption and wide market penetration of SAFEWAY2SCHOOL system.

As noted in section 6.4.2.5 the project builds on the Swedish Smart School Bus pilot study and the project is focused on developing an ITS (Intelligent Transport System) that can improve communication and in turn the safety of children using the bus to get to school. It is too early to report findings from this research but progress can be followed via the project website: http://safeway2school-eu.org/

7 Recommendations

The following ten recommendations are based on an appraisal of the information and evidence contained within the report. The recommendations suggest ways to address the key areas of child casualty risk on the school journey, while encouraging a holistic and consistent approach across Scotland. The recommendations are not an exhaustive list of safety measures and individual authorities may identify other safety measures specific to their needs.

Local authorities are encouraged, along with their partners, to consider how these recommendations could be used to improve school transport safety in their area.

These recommendations are used as the basis for the guidance document that accompanies this report, in which they are supplemented with examples of good practice and links to further information.

1. Reduce speeds on school routes and around schools

The greatest road casualty risk to school pupils occurs when they are walking (including when walking to or from a bus or a car) or cycling. Reducing motorists' speeds on routes used by school pupils and around the school zone will reduce the likelihood of collisions occurring and will reduce the severity of any collisions that do occur.

Local authorities should use the powers available to them to set permanent or part-time 20 mph limits around every school where possible, divert unnecessary traffic from school routes in the morning and the afternoon, and use traffic calming measures to reduce average speeds.

While many authorities have already sought to improve school zones and implement 20 mph speed limits around schools, it is likely that more improvements can be made, which are necessary to reduce child casualties and meet the casualty reduction targets set for 2020.

2. Encourage motorists to reduce their speed when passing stationary school buses

One of the most common casualties involving a school bus occurs when pupils cross the road after alighting from the bus. The school bus can act as a visual barrier to other drivers intent on passing the bus to continue their journey. Motorists are unaware that a pupil has begun to cross from behind the bus and can only react once the pupil suddenly appears in the road. At slower speeds drivers have more time to react and where a collision does take place, the severity is reduced.

Several countries now impose speed limits when passing school buses to maintain traffic flow but reduce speed around the bus. Enforcement has proved difficult in other countries, although setting a speed limit does highlight the issue to motorists and can result in reducing average speeds when passing buses.

It is important that speeds are lowered around stationary school buses so that the casualty risk to children as pedestrians is reduced. To achieve this, motorists will need to be made aware of two things:

1. How to identify a school bus that is picking up or dropping off school children.
2. That there is a legitimate reason for reducing speed around school buses due to the specific risk when passing a school bus of a school child suddenly appearing on the road from behind the bus.

If drivers are able to clearly differentiate a school bus carrying children from any other bus, and there is a perceived legitimacy of the message to slow down, then a campaign to reduce speeds may be successful.

Local authorities could consider the following ways of increasing school bus conspicuity, although it is likely that when making any changes, a campaign to raise awareness to other motorists of what they mean will also be required:

- **Improving signage** – use of the current bus sign is not sufficient and is unlikely to have any impact on drivers' speeds around school buses. Larger, more conspicuous signs should be used, and removed when school pupils are not being carried.
- **Use lights** – hazard lights should always be used when pupils are embarking or alighting from school buses to improve consistency of use across Scotland. Operators could install additional hazard lights where possible, although this will be dependent on the type of vehicle. Additional lights could also be used to improve school bus conspicuity when pupils are embarking or alighting from the bus.
- **Use technology** – SeeMe® is a system that uses flashing lights on school bus stops that are triggered by a transponder carried by pupils. The aim is to improve drivers' awareness of the presence of pupils and reduce speeds. This or similar technology that could influence drivers' speed around school buses should be considered, although care should be taken to evaluate effectiveness of any new systems (see recommendation 10).

3. Set minimum safety standards in school transport contracts

Many authorities are already aware that school transport contracts offer an opportunity for local authorities to stipulate minimum standards required of school transport operators to guarantee safe practices. The Scottish Consumer Council (2005a) provides advice for local authorities on this matter as outlined in section 4.9 on page 36.

Contracts should insist on the use of safe vehicles (e.g. all vehicles fitted with 3 point seat belts), safe practices (e.g. drivers ensure all pupils wear seat belts) and safe drivers (e.g. over 25 years old with over 3 years driving experience). In addition, local authorities should use a penalty points system, with the option of contract termination, to enforce compliance and maintain standards.

4. Risk assess school transport pick-up and drop-off areas

All local authorities should have a procedure in place for undertaking formal risk assessment of school pick-up and drop-off areas. These areas must be fit for purpose and should not put school pupils at risk when being picked up and dropped off or when waiting.

Particular attention should be given to pupil behaviour when they alight from the vehicle and to their 'desire line' (the most commonly used pedestrian route) where they may need to cross the road. Additional infrastructure (e.g. guardrails, formal crossings) may be necessary to delay pupils from alighting from the bus and immediately crossing the road.

Other important factors include visibility distances (i.e. from what distance can a motorist see a pupil at the pick-up point?) and waiting areas (e.g. how safe is the waiting area for the number of pupils being picked up?).

Local authorities should communicate with drivers, operators, parents and pupils to identify specific risks where pupils are being picked up and dropped off.

5. Review school travel plans, improve communication and clarify responsibilities

Some school travel plans and safer routes to school schemes may benefit from being reviewed in light of the new road safety targets for 2020. Local authorities should continue to actively encourage and support schools with their school travel plans. The best school safety schemes demonstrate good communication between local authorities and the other parties involved with school transport, from transport operators to the pupils themselves. Open lines of communication with the local authority coupled with enthusiastic 'road safety champions' have the ability to drive significant improvements towards increasing school transport safety (see Newson *et al*., 2010).

In addition, local authorities should clarify and document their responsibilities for school transport safety and detail what is expected of parents, transport operators, schools and pupils. This clarification should be clearly communicated to everyone involved with the provision and use of school transport.

6. Raise awareness of desired behaviours

Local authorities should communicate desired behaviours to improve safety with parents and pupils. These might include highlighting areas of risk such as suggesting that parents wait for pupils on the side of the road where they are dropped off to avoid pupils looking to immediately cross when alighting from the bus. Similarly, parents could be made aware of drop-off rules outside the school to improve congestion and safety.

Authorities should be aware that the distribution of educational material is not always directly related to improving casualty rates and can in fact increase exposure to a risk in some situations (see recommendation 10). For this reason, authorities must consider their material carefully and should seek advice where they are uncertain of the outcome. It is suggested that authorities monitor the desired behavioural change (e.g. whether parents follow recently promoted drop-off rules or not) and consider whether the material should be stopped where negative behavioural change is perceived, or reinforced, possibly with enforcement, where positive behavioural change requires support.

7. Promote on-road pedestrian and cyclist training

Forms of on-road training for pedestrians and cyclists have been evaluated and suggest that important road safety skills can be learned. All schools that encourage active travel should offer 'real world' training that has been suitably evaluated to improve desired behavioural safety outcomes and not simply approval ratings. Training should be offered in the format in which it was designed and evaluated. Training that has not been evaluated could lead to overconfidence and can increase pupil exposure and risk, resulting in an increase in casualties.

8. Encourage schools to use Road Safety Scotland's educational material

Road Safety Scotland (RSS) offers a full range of educational material with themes that develop with pupils as they grow older and require focus on different road safety skills. The educational material has been designed to comply with the Experiences and Outcomes within Curriculum for Excellence especially within Health and Wellbeing and provides active learning which enables links to Literacy, Numeracy and the wider curriculum. This material should be used throughout Scotland to communicate a

consistent message and aid the development of a road safety culture, although care should be taken to evaluate against desired outcomes wherever possible (see recommendation 10).

9. Discourage young novice drivers from driving to school and transporting others

Young novice drivers are more likely to be crash-involved than experienced drivers. Crash risk increases further when driving in the presence of peers.

Young novice drivers should be discouraged from driving to and from school and parents should be discouraged from allowing young novice drivers to transport siblings or friends to school on their own.

Supervised driving (e.g. with a parent) is a safer way for new drivers to gain experience and parents should be encouraged to travel with young drivers.

Authorities and schools could target pupils who drive to school and encourage and support them to use an alternative mode of transport where supervised driving is not possible.

10. Evaluate all interventions

Good intentions do not necessarily lead to good interventions. Some well meaning interventions can increase casualty risk. Education, training, infrastructure improvements and publicity have all been shown in some circumstances to increase, rather than decrease, risk in various domains seeking to change behaviour, including road safety.

All new interventions should be well thought out, and based on a formal body of knowledge wherever possible; the desired safety outcomes should be defined, and an evaluation with measurement of those outcomes designed where existing evaluation data are not available.

Good evaluation is even more important if possible increased exposure to risk is seen through modal shift from less risky to more risky modes.

Useful links to further information

School transport guidance

A Guide to Improving School Transport Safety
www.transportscotland.gov.uk/strategy-and-research/publications-and-consultations/improving-school-transport-safety-guide

School Transport Guidance Circular
www.scotland.gov.uk/Topics/Education/Schools/Parents/transport-guidance

Scotland's Road Safety Framework to 2020
www.scotland.gov.uk/Publications/2009/10/01090036/0

Guidance from the Scottish Government on setting 20 mph limits
http://www.scotland.gov.uk/Publications/2006/08/14134225/0

Department for Transport: School travel
www.dft.gov.uk/pgr/sustainable/schooltravel/

Reports

School Transport: Survey of good practice
www.scotland.gov.uk/Publications/2007/03/16091028/7

Scottish Consumer Council: Travelling to School report
http://webarchive.nationalarchives.gov.uk/20090724135150/http://scotcons.demonweb.co.uk/publications/reports/documents/rp12travel_000.pdf

General

Road Safety Scotland
www.roadsafetyscotland.org.uk

Sustrans Scotland
www.sustrans.org.uk/what-we-do/safe-routes-to-schools/whats-in-your-area/scotland

Cycling

Cycling Scotland
www.cyclingscotland.org/

Cycling by Design: Transport Scotland cycle infrastructure guidelines
www.transportscotland.gov.uk/strategy-and-research/publications-and-consultations/cycling-by-design

Vehicle regulations and seat belts

A guide to seat belt requirements, including relevant legislation
http://www.dft.gov.uk/pgr/roads/vehicles/vssafety/minibusandcoachseatbelts

The Safety of School Transport covers driver regulations, seat belts and taxis
www.rospa.com/RoadSafety/info/schooltransport.pdf

Minibus safety code of practice
www.rospa.com/roadsafety/info/minibus_code_2008.pdf

The safety of child wheelchair occupants in road passenger vehicles
http://www.trl.co.uk/online_store/reports_publications/trl_reports/cat_vehicle_engineering/report_The_safety_of_child_wheelchair_occupants_in_road_passenger_vehicles.htm

Education, training and evaluation

The North East School Transport Safety Group's Bus Stop! Campaign
www.1second1life.co.uk

Kerbcraft
www.kerbcraft.org

Road safety evaluation toolkit: E-valu-it
www.roadsafetyevaluation.com/

Other

EU SAFEWAY2SCHOOL project
http://safeway2school-eu.org/

Bullying online
http://www.bullying.co.uk

Anti-bullying service funded by Scottish Government
http://www.respectme.org.uk/

Enquire School Transport Advice (Scottish Government funded support service for children and young people with additional support needs)
http://www.enquire.org.uk/pcp/pdf/enquire-factsheet-07.pdf

Glossary

ATCO	Association of Transport Coordinating Officers
CWSS	Cycling, Walking and Safer Street schemes
DfT	Department for Transport
ITRD	International Transport Research Document
KSI	Killed and Seriously Injured
LGV/HGV	Large Goods Vehicle/Heavy Goods Vehicle
LTSA	Land Transport Safety Authority
NTS	National Travel Survey
PCV	Passenger Carrying Vehicles
PPE	Personal Protective Equipment
PUDO	Pick-Up and Drop-Off
PVG scheme	Protecting Vulnerable Groups Scheme
RSOs	Road Safety Officers
RSS	Road Safety Scotland
SCOTS	Society of Chief Officers of Transportation in Scotland
SCTS	Scottish Cycle Training Scheme
SHS	Scottish Household Survey
SMID	Scottish Index of Multiple Deprivation
SPT	Strathclyde Partnership for Transport
SRTS	Safer Routes to School
SSTAG	Scottish School Travel Advisory Group
STPs	School Travel Plans
TRACS	Transport Research Abstracting and Cataloguing System
VOSA	(Vehicle & Operator Services Agency)
YSB	Yellow School Bus

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Appendix A Additional risk data

A.1 Scottish Population statistics

A.1.1 Scottish population – 2009 mid year estimates by age and gender

Age	Males	Females	Total
5-10	166,226	158,672	324,898
11-15	152,766	145,687	298,453
Total	318,992	304,359	623,351

A.1.2 Scottish population – 2008 estimates by urban rural classification

2008 data	5-10	11-15	Total
Large Urban Areas	118,443	107,122	225,565
Other Urban Areas	102,138	94,858	196,996
Accessible Small Towns	30,971	29,721	60,692
Remote Small Towns	11,584	11,702	23,286
Accessible Rural	42,744	38,895	81,639
Remote Rural	21,346	21,038	42,384
Scotland Total	327,226	303,336	630,562

A.1.3 Scottish population – 2008 estimates by SIMD deciles

Deciles	5-10	11-15	Total
1 (most deprived)	35,302	30,730	66,032
2	32,765	29,752	62,517
3	30,664	28,244	58,908
4	30,206	28,448	58,654
5	31,256	29,133	60,389
6	31,207	29,644	60,851
7	32,522	30,949	63,471
8	34,936	31,565	66,501
9	34,458	32,694	67,152
10 (least deprived)	33,910	32,177	66,087
Scotland Total	327,226	303,336	630,562

A.2 Scottish Household Survey (2008) data - School children in full-time education, usual method of travel to school

	Walking	Passenger Car/Van	Bicycle	School bus*	Service bus	Rail	Other	*Sample (100%)*
All children in ft ed 2008:	48.8	23.6	1.5	16.5	7.3	0.7	1.5	2,750
By gender:								
Male	48.7	23.5	2.3	15.6	6.9	0.8	2.2	1,434
Female	49.0	23.8	0.6	17.5	7.8	0.6	0.7	1,316
by age:								
age 4-5	54.4	37.5	1.5	5.7	0.8	0.0	0.0	200
age 6-7	53.7	32.8	1.3	9.0	1.3	0.0	1.8	460
age 8-9	55.8	31.4	1.8	7.6	2.7	0.2	0.6	440
age 10-11	55.5	22.4	3.3	13.0	3.5	0.4	1.9	421
All 4-11	55.0	29.9	2.0	9.4	2.3	0.2	1.2	1,521
age 12-13	45.2	15.8	1.1	23.3	11.3	1.1	2.3	460
age 14-15	41.8	17.0	0.8	24.8	12.4	1.3	1.8	504
age 16-18	35.4	16.6	0.3	27.0	17.7	2.1	0.9	265
All 12 - 18	41.9	16.5	0.8	24.6	13.0	1.4	1.8	1,229

	Walking	Passenger Car/Van	Bicycle	School bus*	Service bus	Rail	Other	*Sample (100%)*
by Scottish Index of Multiple Deprivation:								
1 (20% most deprived)	54.9	17.4	0.5	13.2	12.1	0.5	1.4	518
2	51.4	20.3	0.8	16.9	8.9	0.8	1.0	526
3	47.3	21.6	1.7	20.5	5.3	0.8	2.8	575
4	36.0	31.0	3.1	22.5	5.6	0.5	1.3	590
5 (20% least deprived)	55.3	26.9	1.2	9.5	5.1	1.0	1.0	541
by urban/rural classification:								
Large urban areas	52.4	24.5	0.6	7.4	12.3	1.3	1.4	915
Other urban	56.7	24.2	1.7	11.4	4.7	0.3	1.0	836
Small accessible towns	51.9	17.1	1.4	25.1	4.5	0.0	0.0	267
Small remote towns	65.4	20.9	3.2	6.8	1.0	0.0	2.8	147
Accessible rural	24.5	25.3	1.5	38.0	5.9	1.2	3.6	344
Remote rural	21.7	23.9	4.3	45.4	2.3	0.0	2.3	241

Rows may not sum to 100% due to rounding

A.3 Stats19 additional data

A.3.1 Percentage of school pupil casualties by mode and gender (2005-09)

Road user type	Pupil to/from school				Alternative criteria			
	Female		Male		Female		Male	
	No.	%	No.	%	No.	%	No.	%
Pedestrian	545	73.2%	767	76.9%	654	50.9%	1053	58.6%
Pedal cycle	13	1.7%	50	5.0%	27	2.1%	166	9.2%
Motor cycle	1	0.1%	1	0.1%	4	0.3%	23	1.3%
Car	104	14.0%	100	10.0%	449	34.9%	405	22.5%
Taxi	5	0.7%	4	0.4%	6	0.5%	10	0.6%
Minibus	7	0.9%	23	2.3%	7	0.5%	24	1.3%
Bus/coach	68	9.1%	50	5.0%	130	10.1%	99	5.5%
LGV	1	0.1%	0	0.0%	3	0.2%	6	0.3%
HGV	0	0.0%	0	0.0%	0	0.0%	1	0.1%
Other	1	0.1%	3	0.3%	5	0.4%	10	0.6%
Total	745	100.0%	998	100.0%	1285	100.0%	1797	100.0%

Columns may not sum to 100% due to rounding

A.3.2 Percentage of school pupil casualties by mode and age group (2005-09)

Road user group	Pupil to/from school				Alternative criteria			
	Primary (5-10)		Secondary (11-15)		Primary (5-10)		Secondary (11-15)	
	No.	%	No.	%	No.	%	No.	%
Pedestrian	395	68%	902	79%	597	54%	965	63%
Pedal cycle	25	4%	38	3%	89	8%	100	6%
Motor cycle	1	0%	1	0%	3	0%	23	1%
Car	105	18%	94	8%	322	29%	318	21%
Taxi	2	0%	7	1%	4	0%	8	1%
Minibus	18	3%	12	1%	19	2%	12	1%
Bus/coach	36	6%	82	7%	64	6%	100	6%
LGV	0	0%	1	0%	3	0%	5	0%
HGV	0	0%	0	0%	0	0%	1	0%
other	2	0%	2	0%	5	0%	8	1%
Total	584	100%	1,139	100%	1,106	100%	1,540	100%

Columns may not sum to 100% due to rounding

Table excludes 464 casualties aged 0-4

A.3.3 Percentage of school pupil casualties by mode and urban rural classification (2005-09)

Road user type	Urban, pop 125,000+	Other urban, 10,000+	Small access towns	Small remote towns	Accessible rural	Remote rural	unknown	Total
Pedestrian	74.9%	72.8%	77.0%	79.9%	31.1%	41.2%	29.2%	65.3%
Pedal cycle	3.8%	7.7%	4.6%	8.9%	2.9%	3.8%	29.2%	4.9%
Car	14.5%	14.2%	10.1%	9.6%	41.8%	29.5%	25.0%	19.7%
Bus/coach	5.3%	3.7%	7.4%	1.6%	15.7%	17.4%	16.7%	7.1%
Other	1.6%	1.6%	0.9%	0.0%	8.5%	8.1%	0.0%	2.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Columns may not sum to 100% due to rounding

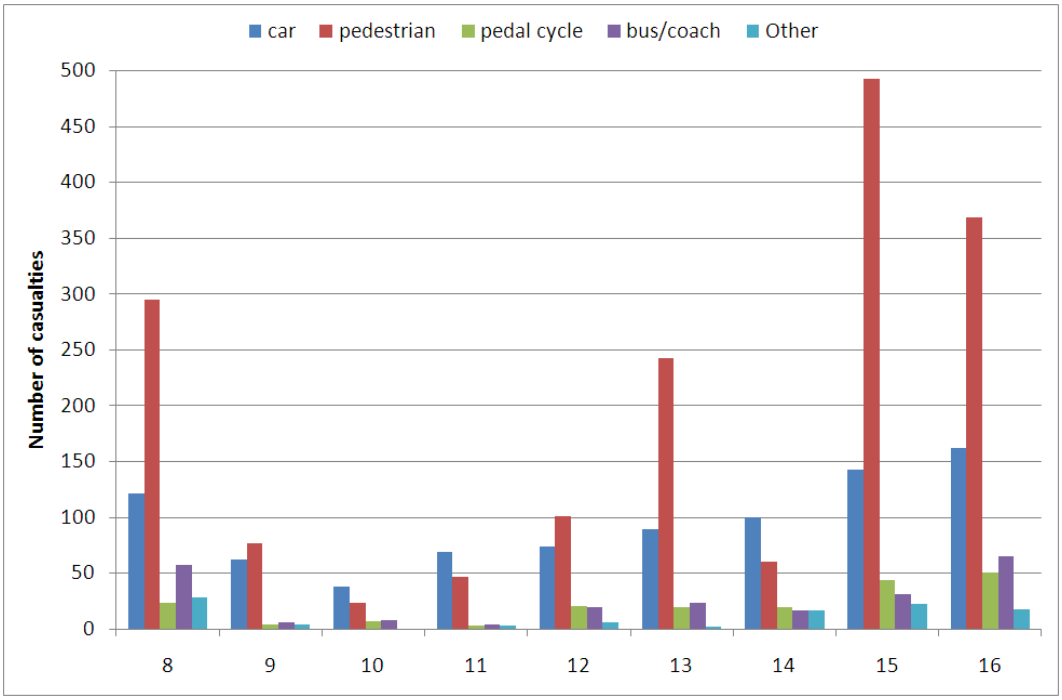
Table based on average of pupil to/from school and alternative criteria

A.3.4 Percentage of school pupil casualties by mode and SIMD quintiles (2005-09)

road user type	Pupil to/from school					Alternative criteria				
	1 (most deprived)	2	3	4	5 (least deprived)	1 (most deprived)	2	3	4	5 (least deprived)
Pedestrian	85.0%	79.3%	64.9%	65.7%	77.1%	67.5%	63.0%	45.9%	40.2%	54.7%
Pedal cycle	3.8%	3.9%	4.1%	3.6%	2.1%	6.7%	7.0%	5.4%	5.8%	6.1%
Motor cycle	0.2%	0.0%	0.3%	0.0%	0.0%	1.4%	0.4%	0.6%	0.8%	1.1%
Car	7.5%	12.1%	13.6%	16.8%	9.7%	16.6%	22.0%	34.2%	41.7%	29.0%
Taxi	0.4%	0.2%	0.6%	1.3%	0.0%	0.4%	0.3%	0.5%	1.0%	0.6%
Minibus	0.0%	1.5%	6.2%	0.0%	1.3%	0.0%	0.9%	3.2%	0.8%	0.0%
Bus/coach	2.9%	2.7%	10.3%	12.0%	9.3%	6.5%	5.9%	8.6%	8.7%	8.6%
LGV	0.0%	0.0%	0.0%	0.3%	0.0%	0.2%	0.1%	0.5%	0.7%	0.0%
HGV	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
other	0.2%	0.2%	0.0%	0.3%	0.4%	0.6%	0.3%	1.0%	0.3%	0.0%
Total (100%)	453	406	339	309	236	806	690	625	607	362

Columns may not sum to 100% due to rounding

A.3.5 Number of school pupil casualties by mode and hour (2005-09, alternative criteria)



Appendix B Local Authority Survey

Dear Sir/Madam

Re: Review of school transport safety in Scotland

As part of Scotland's Road Safety Framework to 2020, TRL has been commissioned to review school transport safety in Scotland. As part of the review, TRL wish to seek the views of all local authorities.

The review is interested in finding out the following information from local authorities:

- What policy is the local authority aware of with regard to school transport safety?
- What does the local authority see as its responsibility with regard to school transport safety?
- Has the local authority engaged in any schemes, trials or evaluations of school transport safety in the last three years?

It would be appreciated if you could complete the following questionnaire so that we can gain your views. You can respond by the following methods:

Online : www.surveymonkey.com/schooltransport

Post : Complete the attached questionnaire and return to Neale Kinnear, TRL, Crowthorne House, Nine Mile Ride, Wokingham, RG40 3GA

If you would prefer not to fill in the questionnaire but have something to say about the topic then I would be pleased to speak to you or receive an email.

Telephone : Neale Kinnear on 01344 77 0101 (direct Line).

e-mail : nkinnear@trl.co.uk

If you have any colleagues or contacts who have any responsibility for school transport safety then please forward on this email.

Responses will be treated in confidence by TRL and no authority will be identified in any reporting unless permission has been given.

All responses are welcome and I thank you in advance for your time and cooperation.

Yours faithfully

Dr Neale Kinnear
TRL

School Transport Safety Survey

Please note: For the purposes of this survey, School Transport refers to any mode by which a pupil gets to and from school (e.g. walking; cycling; school bus; public bus; car)

Name	
Local Authority	
Department	
Job Title	

Please rate to what extent you consider school transport safety to be a priority area within your authority?

Low Priority — High Priority

☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

How would you rate your local authority's current knowledge of Government policy related to school transport safety?

Low — High

☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

How confident are you that the authority is aware of all relevant Government policy related to school transport safety?

Not at all — Extremely

☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

In your opinion, how would you divide responsibility between the following people or organisations for ensuring that pupils get to and from school safely?

Please ensure that your percentages add up to 100%.

%	%	%	%	%	**=100%**
Parents	Schools	Bus companies	Local Authority	Other (please state)	

What aspects of getting to and from school do you see as being the responsibility of the local authority?

Extra space for answers is available on the final page

Does your local authority have its own policy relating to any aspect of school transport safety?

Yes ☐1 No ☐2

If yes, please give details. If there is an online link please write that here also.

Extra space for answers is available on the final page

Has your local authority been involved in any schemes, trials or evaluations which have aimed to improve school transport safety within the last 3 years?

Yes ☐1 No ☐2

If yes, please give details. If there is an online link please write that here also.

Extra space for answers is available on the final page

Is your local authority involved in any working groups with schools, parents, bus companies or other interested parties where school transport safety is discussed?

Yes ☐1 No ☐2

If yes, please give details. If there is an online link please write that here also.

Extra space for answers is available on the final page

Does your local authority have a School Travel Coordinator?

Yes ☐1 No ☐2

If yes, please provide contact details if known.

Extra space for answers is available on the final page

If required, would you be happy for us to contact you in relation to this project?

Yes ☐1 No ☐2

If yes, please enter your contact details	
Telephone No.	
Email address	

Extra space for answers or comments

PLEASE RETURN TO: Neale Kinnear, TRL, Crowthorne House, Nine Mile Ride, Wokingham, RG40 3GA