The Safety of Schoolchildren on London's Roads

Final Report for London Road Safety Unit, Transport for London

April 2007

mvaconsultancy

Contents

Tables

Acknowledgements

Acknowledgements

The report was prepared by Jacqui Dunning, Kate Jones and Martin Dix with research and analytical support from Pamela Chatterjee, Martin Dale, Anita Friend, Erik Neilson and Carry Stephenson.

The authors are grateful to the organisations and individuals who kindly provided information and assistance with the research, including in particular the DfES for providing information from the annual School and Pupil Census. The authors remain solely responsible for any errors, together with any views expressed in this report, which do not necessarily reflect those of TfL.

Reference

The citation reference for this report is ‘The Safety of Schoolchildren on London’s Roads’ by Dunning, Jones, and Dix (2007), report of research for the London Road Safety Unit, Transport for London, undertaken by The MVA Consultancy.

Summary

Background

The Mayor of London has adopted ambitious targets for reducing casualties which include reducing child killed and serious injury (KSI) casualties by 60% by 2010, compared with the 1994-98 average. School travel is an important for policy, with measures to encourage more walking and cycling being potentially in conflict with parents' concerns over road safety and children's personal security.

This study has assessed the safety of school journeys in London and gained a better understanding of the factors associated with increased injury risk. It is hoped that the outcomes will inform practitioners involved in planning, funding and implementing road safety schemes and initiatives.

Method

The study began with a review of the available literature on the factors that influence road safety amongst children on the school journey. The evidence was fairly limited, and London-specific information was particularly scarce. However, we were able to construct initial hypotheses for subsequent statistical analysis using an edited extract of the ACCSTATS database containing STATS 19 data for London, and various other data supplied by Transport for London (TfL), the Greater London Authority (GLA) and Department for Education and Skills (DfES).

Key Findings

There has been a clear trend of improvement in recent years in the road safety of most children travelling to and from school in London, the main beneficiaries being pedestrians. By 2005, in comparison with the 1994-98 baseline, the total number of casualties among children aged 4 to 15 has fallen by 46% and KSIs have dropped by 60%, already exceeding the 2010 target.

In 2005, the most recent full year of data at time of writing, 538 (31%) children were injured on school journeys in London and 1,192 (69%) were injured on other journeys. The injuries sustained in collisions on school journeys are, on average, less severe. Since 61% of all children's journeys are to or from school, this suggests that the school travel is comparatively safe.

Nationally, modal shares for walking have been declining in recent years as more school journeys are made by car and public transport. The switch from walking has been greatest amongst primary schoolchildren, and it is these who have seen the greatest fall in casualties, compared to the other age groups. There has also been a fall in cyclist casualties in the period since 1990 (the period examined). Whilst this is small, it is important, as more children are now cycling (particularly older children). In contrast, child car passenger casualties have fluctuated and increased slightly overall (by 9%) and casualties amongst bus users have remained steady, but at a low base.

In London, the distance travelled to school has been rising amongst primary schoolchildren and fallen slightly amongst secondary schoolchildren. In 2005, two thirds of all pupils (66%) travelled less than 1.6 km (one mile) to their school, and just 7% travelled more 4.8 km (three miles). Boys, older pupils and pupils in Outer London boroughs (especially in South London) tend to have longer journeys. The mean distance from home to collision locations for all casualties is 1.8km, and the mean distance from school is 1.9km, but half of those injured are involved in collisions less than a kilometre from home and school. Collisions involving child pedestrians occur, on average, significantly nearer to the childrens' home and school locations.

There are marked differences in the safety of London children in different age and sex groups, for school and other journeys. The youngest group, of 5 to 10 year olds, accounts for 32% of all casualties on the school journey, but contains significantly more (49%) casualties occurring on other journeys. The 11 to 12 age group accounts for 34% of all casualties on the school journey but only 20% on other journeys, while the oldest group account for about a third of casualties on both types of journey. More casualties on school journeys involve boys, and their number peaks at 11-12 years. Although very few children currently cycle to or from school (typically only 1%) they account for 4% of all casualties with a disproportionately large number being KSIs, and these casualties are almost all boys.

Using the police definitions of ethnicity, and reporting officers' accounts of the ethnicity of casualties, although White children make up the largest proportion of all casualties on school and other journeys, Black children have a higher risk of injury than children from all other backgrounds on both school and other journeys. They are twice as likely to be injured as White children and nearly three times as likely as Asian children. Although these comparisons do not take into account links between ethnicity and deprivation, which may be a key explanatory factor, the evidence suggests that specifically targeted and tailored safety information and education campaigns should be considered.

There has been a clear downward trend in casualties involving London schoolchildren. By 2005, in comparison with the 1994-98 baseline, all casualties have fallen by 46% and KSIs have dropped by 60%, already exceeding the 2010 target. The fall in casualties on school journeys has been less pronounced than that for other journeys, but has yet to tail off suggesting that there is still some potential for further reductions. Trends among some groups do not match this overall pattern. Casualties among Black children have been rising (from 20% to 31% of all casualties between 1995 and 2005). This is not explained by changes in the 4-15 years Black population in London and may be linked to more walking and higher deprivation in the Black community[1]. The greatest changes on school journeys since 1994–98 have been amongst the 11-12 year olds (-27%, compared to -24% for 4-10s and -20% for 13-15s), and boys (-32% compared to -26% for girls), resulting from greater proportional reductions in both KSIs and slight injuries.

Overall, the road safety of most children travelling to and from school has, therefore, been improving in London. The main beneficiaries are pedestrians, though the proportion of children walking to school has also been declining with the switch to car, and to a lesser extent, bus and other modes. So some of the casualty savings will have come from the fall in children's exposure to risk.

Analysis of London casualty data has also identified circumstances that influence or contribute to collisions. Most collisions occur during daylight, and on children's journeys home from school. However, collisions involving child cyclist and car passenger casualties in London are more likely to happen during the morning journey to school. The large majority of collisions occur in fine weather, although collisions involving cars carrying schoolchildren may be more likely when there is a combination of wet road surfaces and otherwise dry weather (such as periods following rainfall when visibility is back to normal). Other contributory circumstances include:

- pedestrians - crossing the road away from crossing facilities, and possibly drivers not paying sufficient attention to pedestrians at junctions;
- car passengers - higher speed limits (40 or 50 mph) at priority junctions;
- cyclists – high vulnerability at priority junctions.

[1] Subsequent research does not support these hypotheses (Steinbach et al (2007): Road Safety of London's Black and Ethnic Minority Groups).

Some of the factors identified could be addressed through road safety education, school travel plans, and continued investment in engineering measures as well as dedicated cyclist facilities. There may also be a case for reviewing the location of pedestrian crossings with relation to desire lines, and the criteria for implementing new crossings.

A programme to implement 20mph zones has led (according to a preliminary inventory) to 360 such zones across London by 2006. Previous studies have shown that 20mph zones have been effective in reducing the number of collisions and the severity of casualties. ACCSTATS analysis shows that very few collisions were recorded in 20mph zones between 2001-2005, and moreover, 10% of collisions occurred in areas that are now in 20mph zones. Arguably, many of these may not have occurred if there had been a 20mph zone in place at the time.

While the road safety of children at different schools varies considerably across London, the average casualty rate is less than one per school every five years. While the variations between schools reflect a range of factors including population, modal shares, socio-demographic profile, and other characteristics, two criteria have been identified clearly as important influencers of school casualty rates. These are the proportion of pupils entitled to free school meals, and the proportion of Black pupils in each school. These criteria could be used for prioritising the implementation of road safety interventions, and perhaps travel plans, across London schools.

Finally, it is important in planning road safety strategy, and the possible role for driver education, to understand how the behaviour of drivers involved in collisions contributed to these collisions. Although London casualty data has only limited information, we have identified that the drivers who were in the car when a child was injured on the way to or from school (whether walking or otherwise) are mostly females, aged 25-44. The drivers involved in collisions with pedestrians and cyclists tend to be local residents. Half are involved in collisions within 3kms of home, and two-thirds have collisions within 5kms of home. There is little difference in the distances from drivers' homes of collisions involving children on school and other journeys.

The study has identified important differences in the safety of London children, especially when comparing school and other journeys. It has also generated a number of hypotheses that it was not possible to investigate in detail, using the data currently available. Further research is needed to better understand how children travel: in particular, their travel patterns and behaviour; how these differ within London; and the factors that influence choices made by children, or for them, in respect of both school and other travel activities. This would further improve the understanding of schoolchildren's road safety in London and the effective development and monitoring of interventions.

1 Introduction

1.1 Background to Study

In 2000, the Government announced a new strategy for improving road safety, including a target for reducing the number of children killed or seriously injured (KSI) by 50% by 2010, compared with the 1994-98 average. Good progress has been made in London and, in 2005, the Mayor revised this with an ambitious 'stretch' target of 60%.

The London Road Safety Unit (LRSU) has been given primary responsibility for meeting the road safety targets. The London Road Safety Plan[2] sets out the policies and schemes that are being implemented to improve road safety, including the safety of schoolchildren. About a third of all child casualties are injured on the way to or from school and there are numerous initiatives aimed at the school journey including Safer Routes to School, School Travel Plans and 20mph zones. These seek to improve the safety and quality of walking and cycling routes for current users, and also recognise the potential for influencing perceptions of these modes to encourage modal shift.

Currently about 48% of children walk to school in London[3], but this proportion has been falling over the last five years as both primary and secondary school age pupils switch to using the bus or travelling by car[4]. Numerous studies[5] have demonstrated that car dependency has detrimental impacts on children's health, fitness levels and their overall development, and also increases vehicular traffic which in turn increases the risk of pedestrian and cyclist injury.

1.2 Aims and Objectives

MVA Consultancy was commissioned to assess the safety of schoolchildren on London's roads and gain a better understanding of the factors associated with increased injury risk.

The research objectives were to:

- Describe and assess the road safety of schoolchildren;
- Explore potential risk factors which influence the road safety of schoolchildren; and
- Analyse the road safety of all London schools, and identify variations between schools.

The outcomes of the study are intended to inform practitioners involved in planning, funding and implementing road safety interventions whether they are in the areas of education, engineering or enforcement.

[2] Transport for London (2001) London's Road Safety Plan

[3] LATS 2001 Household Survey

[4] DfT, Travel to School in GB Personal Travel Factsheet 2, January 2003 and DfT Regional Trnsport Statistics 2005.

[5] See reports on the *Effect of travel modes on children's cognitive development* for DfT, 2001 and *Reducing children's car use: the health and potential car dependency impacts* for EPSRC, 2004 for an introduction to this area of research

1.3 Literature Review and Initial Hypotheses

The study began with a literature review of the factors that influence road safety amongst children on the school journey. The search strategy targeted on-line publications, the International Transport Research Documentation (ITRD) Database and MVA's own library of road safety reports, conference papers and journals. We used a combination of search terms to describe children, school travel and road safety to maximise the information captured.

The titles and abstracts were scanned for relevance to the research area. The exclusion criteria comprised research that focused on school travel in rural areas, children outside the statutory school age of 4-15, and pupils with special educational needs as these areas were beyond the remit of this study.

The resulting literature was mapped into the following areas:

- Trends in travel patterns for journeys to/from school;
- Demographic, socio-economic and behavioural factors affecting injury risk; and
- Local area characteristics and other circumstances that contribute to collisions.

The evidence was fairly limited, and London-specific information was particularly scarce, so the search was extended to material from other urban areas in the UK and overseas. It is however recognised that this may not be directly applicable because of differences in travel options, social make-up and societal concerns between London and elsewhere. The following sections set out the key findings and show how they were used to construct initial hypotheses for subsequent statistical testing in the main part of the study.

Trends in Travel Patterns

There have been considerable changes in school travel since 1990. The National Travel Survey (NTS) shows that in 1989/1991, 15% of primary schoolchildren and 46% of secondary schoolchildren travelled to school unaccompanied by an adult. Since then, the average distance travelled has increased and the proportion travelling unaccompanied have fallen (Table 1.1), as more pupils, particularly younger children, switch from walking to travel by car.

Table 1.1 – National Trends in School Travel

	89/91	92/94	95/97	98/00	02/04
5-10 year olds					
Average distance (miles)	1.3	1.2	1.3	1.5	1.5
Travel alone (%)	15	15	9	12	n/a
11-16 year olds					
Average distance (miles)	2.8	3.1	3.1	3.0	3.2
Travel alone (%)	46	48	45	39	n/a

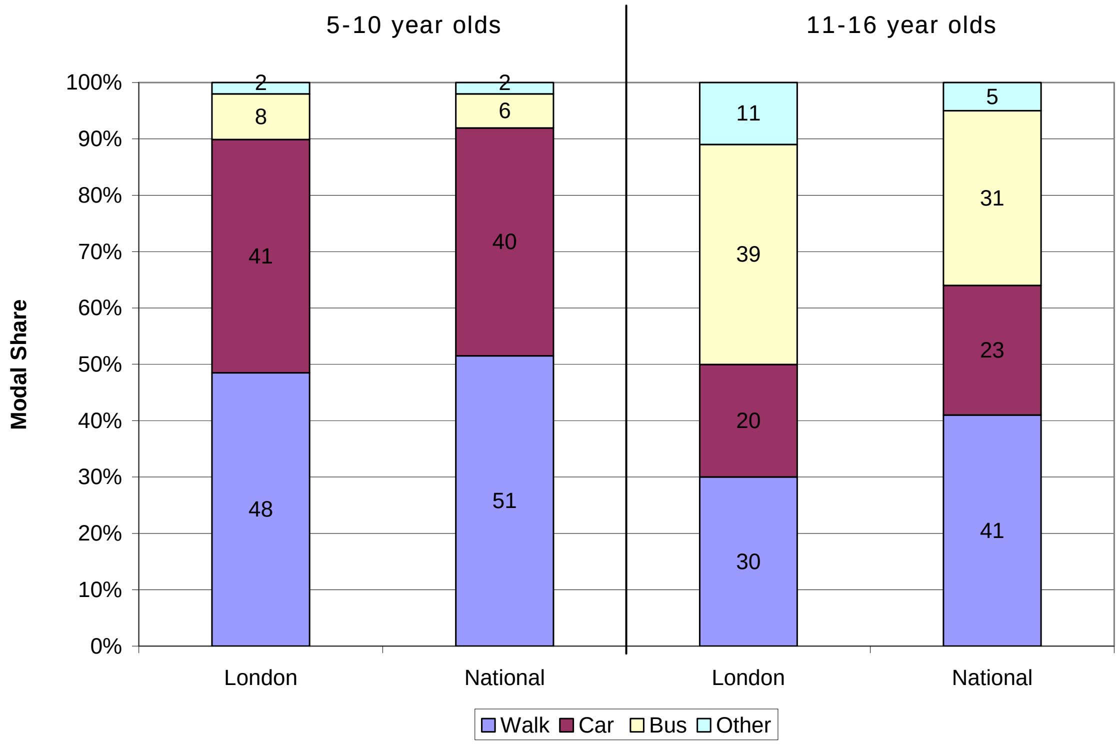
Note: data on unaccompanied travel is only available at the national level.

Source: DfT, Focus on Personal Travel (2001) and 02/04 update direct from NTS team.

In the latest results (for 2002-2004), 51% of primary schoolchildren and 41% of secondary schoolchildren walk, and 40% and 23%, respectively, go by car. Bus use is rising amongst the 5-10 year olds, but declining amongst older pupils, whilst cycling remains very low, but is rising amongst secondary schoolchildren.

In London, the average distance to primary school has been rising in line with the national trend and by 2002-4 was 1.6km. However, the average distance to secondary school has stopped rising, and fallen slightly to 3.1km[6].

Modal shares for walking and travelling by car have been following the national trends, however, bus use is rising in London[7], whereas nationally it has remained steady. The resulting picture for primary schoolchildren is comparable with the national average, but secondary schoolchildren differ, with fewer walking and more travelling by bus, train and Underground than average (Figure 1.1).



Source: DfT National Travel Survey Team 2006 (unpublished), Data is for 2002-2004

Figure 1.1 – Modal Shares for School Travel in 2002-2004

These changing travel patterns have mixed implications for road safety. The risk of being involved in a collision increases with the distance travelled, however, the switch to car (and bus,

[6] DfT (2005) Regional Transport Statistics

[7] Free bus and tram travel for under 11s living in London was introduced in 2004. This was extended to children under 16 in September 2005 and 17-18 year olds in full-time education in September 2006.

in London) is reducing exposure to injury for those who now travel by motorised modes. Meanwhile, rising traffic volumes are increasing the risk of injury to pedestrians.

Demographic, Socio-Economic and Behavioural Factors

Many studies have found that **sex and age** are important factors contributing to increase injury risk. Boys are more likely to be injured than girls. This tends to be because of a variety of factors including different levels of exposure to injury, particularly because they cycle more[8], and their attitude to road safety and risk taking. This difference is greater amongst younger children[9] and the gap tends to close in the teenage years[10].

Generally, younger pupils have a lower risk of injury because their journeys are shorter, they travel more by car, and as pedestrians, they are exposed to less traffic and fewer crossings on the journey to school.[11]

In London, child pedestrian casualties peak at around 11 and 12 years old, when pupils moving up to secondary school tend to travel further and often by a different **travel mode**[12].

A study of road safety in the inner London boroughs of Camden and Islington[13] found that 69% of primary schoolchildren walked to school, 26% travelled by car, 0.2% cycled, and 5% went by public transport. The strongest predictors of car travel and hence reduced exposure to road traffic injury were car ownership, distance to school, attendance at an independent school, and parental concern about abduction, not road safety.

Deprivation is correlated with injury risk at all ages, and strongly linked to child pedestrian deaths[14], probably because of differences in exposure (children in more deprived areas being more likely to be walking). Recent research in London has shown that the pedestrian injury rate for children in the most deprived parts of London is almost three times higher than the rate for those living in the least deprived areas[15].

Many studies have found links between **ethnicity** and injury risk. . Evidence suggests that this may be partly explained by the strong link between ethnicity and deprivation and that underlying factors may include lack of familiarity with traffic, lack of road safety training, language barrier, time spent in dangerous environments, or a lack of supervision[16].

Ethnicity is particularly relevant to London which has a diverse population and many Black and Minority Ethnic (BME) communities living in areas alongside busy roads. LRSU research has found

[8] LATS 2001 Household Survey

[9] Bly, Dix and Stephenson (1999) Comparative Study of European Child Pedestrian Exposure and Accidents. Report to Department for Transport by MVA Consultancy, Woking.

[10] AA Foundation for Road Safety Research (1994). Pedestrian Activity and Accident Risk.

[11] Bly, Dix and Stephenson (1999) *op cit* and Bly, Jones and Christie (2005) Child Pedestrian Exposure and Accidents, DfT Road Safety Research Report No. 56, September 2005

[12] Transport for London (2001) London's Road Safety Plan

[13] DiGuiseppi et al (1998) Determinants of car travel on daily journeys to school: cross sectional survey of primary schoolchildren, British Medical Journal, 316:1426-1428

[14] Jarvis, S., (1999) Why do we need action on injury in the UK? Public Health Forum, 3, 1, 5.

[15] Edwards, P., Green, J., Roberts, I., Grundy, C., and Lachowycz, K. (2006) Deprivation and road safety in London. A report to the London Road Safety Unit. London: LSHTM

[16] Department for Transport (2002) Road accident involvement of children from ethnic minorities

that children and young people from the Black African and Caribbean communities are more likely to be killed or injured as a pedestrian than any other ethnic group[17].

There is evidence that children, unlike adults, are more likely to be involved in a collision as a pedestrian whilst travelling in a group, possibly because they are distracted and do not focus on potential dangers around them[18].

Local Area Characteristics and Other Circumstances

We were not able to find any specific research linking local area characteristics with the road safety of children travelling to school by bus or car. There is literature on the safety of child pedestrians and this suggests that the key influences on pedestrian injury risk are the presence of **crossing facilities, the type of road and traffic speeds**.

A national study by the AA[19] found that one third of school aged casualties occurred on the way to/from school. Of these 33% were injured on main roads; 43% on local distributor roads and 24% on residential roads. Child pedestrians are more likely to be involved in collisions on urban roads with on-street parking because they tend to cross between parked cars where they have restricted view of on-coming traffic[20].

Many studies have shown that engineering interventions such as **traffic calming** which have reduced traffic speeds and/or flow have led to reductions in collisions involving pedestrians and cyclists[21]. However, a growing body of evidence suggests that pedestrians feel more secure in traffic calmed areas and tend to walk into the road more and pay less attention to potential dangers, so casualties may not decrease but the severity of injuries will[22].

A review of **20mph zones** in London[23] found that mean traffic speeds had fallen by 9mph and flows by 15%. Allowing for background changes in road user casualty frequency on unclassified roads, this led to a 45% reduction in casualties and a 57% reduction in people killed or seriously injured[24].

In addition to physical characteristics, certain circumstances can also contribute to greater risk of injury. In particular, adverse **weather and light** conditions can affect visibility, driver behaviour and stopping distances. A study of child pedestrian fatalities in England and Wales between 1986-

---

[17] LRSU, (January 1995), Differences in Child Road Traffic Injuries: Trend analysis for London from baseline 94/98 and five-year follow-up

[18] Chinn, L., Elliott, M., Sentinella, J., & Williams, K. (2004). Road safety behaviour of adolescent children in groups: Final report (TRL Report 599).

[19] AA Foundation for Road Safety Research (1994). Pedestrian Activity and Accident Risk.

[20] Roberts, H., Smith, S.J., and Bryce, C., (1995) Children at Risk? Safety as a social value. Oxford University Press, Buckingham.

[21] See Christie, N., (1995) Social, economic and environmental factors in child pedestrian accidents: A research review. Transport Research Laboratory, Project Report 116, for an introduction to this area

[22] Hine, J., and Russell, J., (1993) Traffic barriers and pedestrian crossing behaviour. Journal of Transport Geography, 1, 230-239.

[23] There were 137 in 2003

[24] Webster, D.C. and Layfield, R.E., (2003) Review of 20mph zones in London Boroughs. TRL Unpublished Report PR/T/077/03.

1995[25] found that the occurrence of fatalities tends to peak in the late afternoon (when children are walking home from school, and walking in darkness in the late autumn and winter months) and more occur in October (possibly because the autumn weather allows walking, but the evenings are drawing in).

Initial Hypotheses for Testing

The literature review suggested that the exploratory elements of the research should focus on the contribution of the following risk factors:

- Mode of travel used;
- Demographic and ethnic characteristics, and deprivation[26] ;
- Local area factors such as the local road environment and 20 mph zones; and
- Other circumstances, such as travelling in darkness and poor weather, that may increase the incidence of collisions.

1.4 Structure of this Report

Following this chapter, this report investigates:

- The overall road safety of children in London, and whether school journeys are comparatively safer than other journey purposes (Chapter 2);
- Trends in road safety over time, taking account of changes in travel patterns (Chapter 3);
- The circumstances that lead to collisions, including weather, speed limits and junction designs (Chapter 4);
- The groups that are most at risk of injury because of how they travel, their age, sex or ethnic background (Chapter 5); and
- Variations in road safety by school (Chapter 6) and between areas (Chapter 7) to explore whether certain characteristics can determine pupil casualties.

Chapter 8 contains our conclusions and recommendations on improving road safety for school aged children, and areas for further research.

Additional information on the data manipulation is contained in Appendix A. Data tables are presented in Appendix B.

---

[25] Sentinella J., Keigan,M. (2004) Young adolescent pedestrians' and cyclists' road deaths: analysis of police accident files, Department for Transport, London.

[26] a parallel study commissioned from LSHTM by LRSU has focussed specifically on *Deprivation and road safety in London : Relationships and Links.* Edwards P, Grundy C, Lachowycz K, Green J, Roberts I (2006).

2 How Safe Are Schoolchildren?

2.1 Method

Approach

School journeys account for nearly two-thirds of the trips made by children[27] and a notable proportion of TfL and Borough spending on local road safety, but it is not known whether these journeys are any more or less safe than other journeys in London.

The following sections consider the overall road safety of children on school and other journeys by comparing the most recent collision and casualty data (up to 2005) from STATS 19 for London in the ACCSTATS database. Using the elements of the dataset that identified the mode of travel used and the personal characteristics of the child, we were able to develop profiles of the casualties.

The profiles illustrate how safety varies between different groups of children and this has been investigated further in the trend analysis (in Chapter 3) and comparison of casualty rates (in Chapter 5). We also look at exposure by considering how far children currently travel to school and whether this varies across London.

Data Source

The casualty analysis was based on ACCSTATS which comprises:

- Casualty data for each recorded casualty;
- Vehicle data for each vehicle involved; and
- Collision data on the circumstances of the collision.

We removed casualties which occurred outside the Greater London boundary and linked the three data sets to give a total of 510,775 records for casualties of all ages for the period 1994-2005. These were then filtered and checked in accordance with the steps described in Appendix A. This included removing older children (see panel), and school journeys that took place outside typical school hours and term times.

Older Children

Within ACCSTATS there are 28,208 casualties aged 16-18. Of these, 483 (2%) were coded as being injured on a school journey. We are unable to verify this as education is not compulsory at this age and school timetables are more flexible for older pupils, especially around exam time. Hence we have focused on children aged 4-15 to improve the robustness of the analysis.

The filtered dataset contained 46,745 school aged casualties. Of these, 9,813 were reported as being injured on a journey to or from school, but:

- 259 were recorded as occurring at the weekend;
- 140 occurred before 7am or after 6pm;

[27] 61% of journeys by children aged 5-15 are journeys to or from school (LATS 2001 Household Survey)

- 600 were outside normal term time.

There could be a case for reclassifying these as 'other' journeys, but given the presence of doubt in the coding, they were removed.

The remaining 36,932 school aged casualties were injured on other journeys. Of these:

- 10,237 occurred on a weekday, between 7am and 10am or 3pm and 6pm, during term time when we would expect children to be travelling to or from school; and
- 1,979 occurred on a weekday, between 10am and 3pm during term time when we expected children to be at school.

There was no way of determining whether these were miscoded school journeys, or travel for other purposes such as authorised leave or trips to doctors, etc. Once again, we decided to exclude these to improve the robustness of the dataset to be analysed, but clearly some could have been school journeys.

The resulting edited dataset for 1994-2005 contained 33,350 school aged casualties, of which 8,814 casualties were involved in collisions on the school journey and 24,716 casualties were making other journeys, as shown in Table 2.1. Clearly this under-represents the total casualties in London, but gives a robust estimate of injuries occurring on school and other journeys.

Table 2.1 - School Aged Casualties by Severity & Journey Purpose in Edited Dataset

Year	All casualties		KSIs		Slights	
	School	Other	School	Other	School	Other
2005	538	1192	64	176	474	1016
2001-2005	3365	8013	536	1286	2829	6727
1998-2005	5852	15001	970	2439	4882	12652
1994-2005	8814	24716	1558	4205	7256	20511

Note: KSIs = killed and seriously injured, slights = slight injuries.

2.2 Comparative Safety of School Journeys

In 2005, the most recent full year of data, 538 (31%) children were injured on school journeys and 1,192 (69%) were injured on other journeys. As 61% of all children's journeys[28] are to or from school, this suggests that the school travel is comparatively safe.

In addition, the injuries sustained on school journeys were less severe than those that occurred on other journeys, as shown by the breakdown of casualties in Table 2.2, but these differences are not statistically significant.

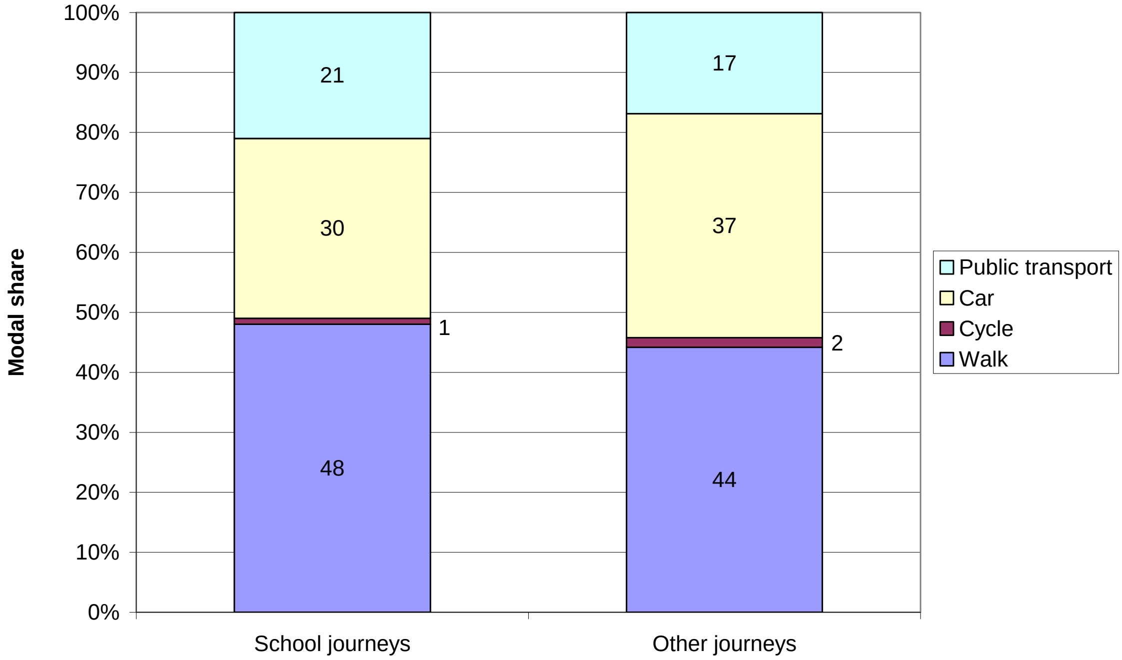
[28] In this report a journey is equivalent to a 'trip' in LATS, and can comprise any number of stages. Walk is only counted when it forms a complete journey, not when it forms part of a longer journey.

Table 2.2 – Breakdown of Casualties by Severity (2005)

	All Casualties	KSIs	Slights
School journey	538	12%	88%
Other journey	1192	15%	85%

Many factors contribute to these differences between school and non-school journeys; the main driver is the typical mode used. More school journeys are made on foot, and whilst pedestrians are at greater risk of injury, local education authorities are required to assess the walking route to each child's nearest appropriate school[29] and continued investment in Safer Routes to School and other initiatives have improved the safety of the pedestrian environment. Hence we should expect school journeys to be safer than other journeys made on foot. Children may also be more familiar with journeys to and from school. School travel involves greater use of public transport and especially bus than other journeys, as illustrated in Figure 2.1, and bus in particular is a very safe mode (see next section). School journeys are also more often multi-modal.

Figure 2.1 Modal Shares for School and Other Journeys in London in 2002-2004



Source: DfT National Travel Survey Team 2006 (unpublished), data is for 2002-2004

2.3 Profile of Casualties on the School Journey

Mode Used

The majority (76%) of children injured on the school journey are pedestrians at the time of the collision (Table 2.3).

[29] Legislation allows parent to send their children to a school that is not the nearest appropriate facility.

Considerably fewer and less severe injuries occur to children using other modes, reflecting the reliance on walking (for end to end journeys and stages of multi-modal trips), and the comparative safety of motorised modes.

Table 2.3 – Profile of Casualties on School Journeys by Mode (2005)

	All Casualties	KSIs
All casualties	*538*	*64*
Pedestrian	76%	86%
Cyclist	4%	5%
Car Passenger	15%	5%
Bus/coach passenger	4%	3%
Other	0%	2%

Note: Percentages do not sum to 100 because of rounding

Very few children currently cycle to or from school (typically only 1%) and yet they account for 4% of all casualties and disproportionate number of KSIs. Further analysis shows that these casualties are all boys.

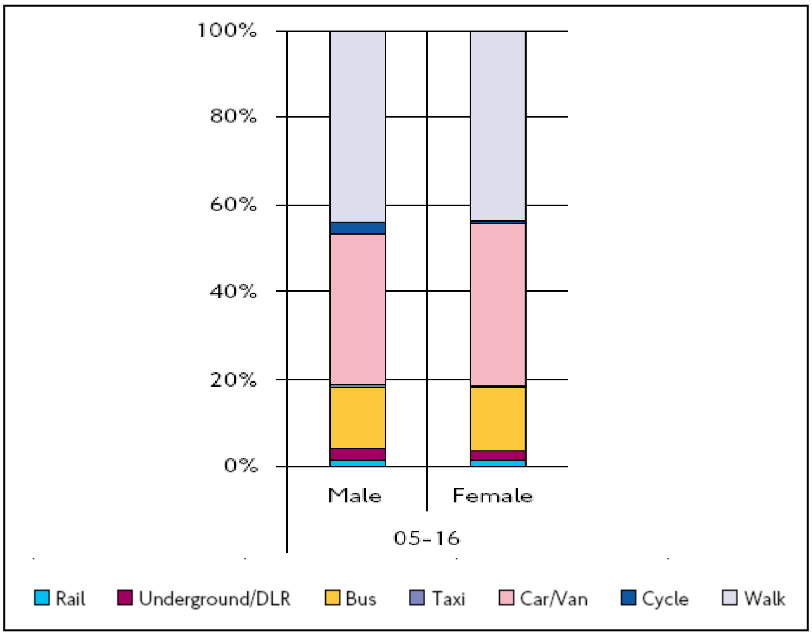
Sex and Age

Boys comprise the majority of all casualties (Table 2.4). They also have more injuries on school journeys (Table 2.6) and this is also true for other journeys. This reflects the significantly greater incidence of cycling by boys (Figure 2.2) and, possibly, different attitudes towards road safety and appropriate behaviour whilst travelling.

Table 2.4 – Profile of Casualties by Sex (2005)

	All Casualties	KSIs
All casualties	*538*	*64*
Boys	56%	55%
Girls	44%	45%

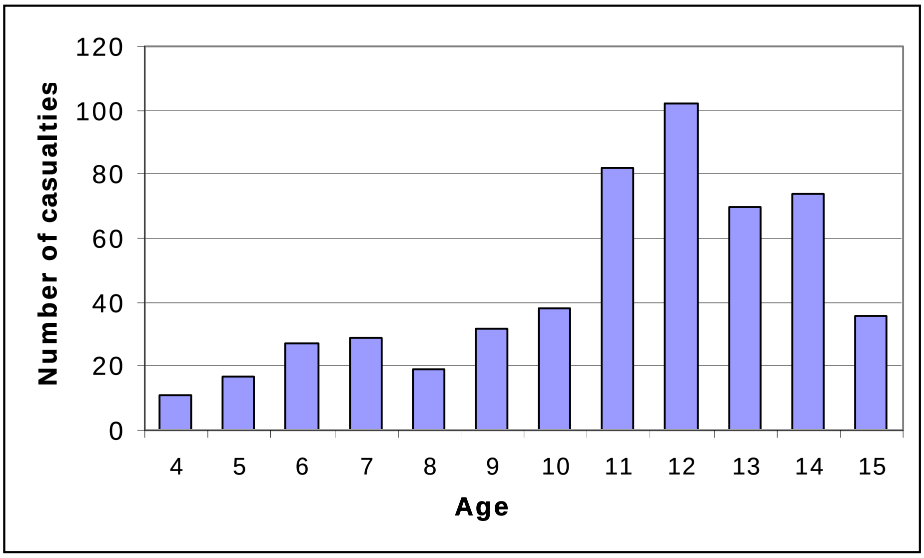
Figure 2.2 –Modal Shares for All Journeys in London by Sex



Reproduced from *London Travel Report*, TfL 2004

The distribution of casualties on school journeys varies with age, as shown in Figure 2.3. There is a peak in casualties at 11-12 years which is to be expected as it is at this age that children move up to secondary school, typically travel further, often independently, and often by a different mode.

Figure 2.3 – Distribution of Casualties on School Journeys by Age (2005)



The peak provided natural partitions which separated the casualties into three age groups of 4-10, 11-12 and 13-15 year olds. The groups contain approximately a third of all casualties on school journeys and a similar representation of KSIs (Table 2.5).

The youngest group accounts for 32% of all casualties on the school journey, but contains significantly[30] more (49%) casualties occurring on other journeys. The 11 to 12 age groups account for 34% of all casualties on the school journey but only 20% on other journeys, while the oldest group accounts for about a third of casualties on both types of journey.

Table 2.5 – Profile of Casualties by Age (2005)

	All casualties		KSIs	
	School	Other	School	Other
All casualties	*538*	*1192*	*64*	*176*
4 to 10	32%	49%	34%	43%
11 to 12	34%	20%	34%	19%
13 to 15	33%	32%	31%	38%

Considering both sex and age, Table 2.6 shows that the groups with the highest proportion of casualties on school journeys are 11-12 year old boys and 13-15 year old girls. We know from Figure 2.2 that girls travel slightly more by car than boys, and this increase in the likelihood of being injured with age may be caused by girls in their mid-teens travelling with young drivers (for example, boyfriends). Research by DfT shows that newly qualified drivers, the majority of whom are also young drivers, are at particularly high risk of being involved in a collision, and as many as one in five has an accident in their first six months of driving[31].

[30] At the 95% confidence level

[31] The main factors contributing to the high risk of collision amongst young drivers are lack of driving experience and skill, attitude to risk taking, overconfidence and peer pressure. Source: DfT, Road Safety Research Compendium 2005/06.

Table 2.6 – Profile of Casualties on School Journeys by Age and Sex (2005)

	Boys	Girls
All casualties	*301*	*237*
4-10	34%	30%
11 to 12	36%	32%
13 to 15	30%	38%
Total	100%	100%

Ethnicity

As there is no individual level data on deprivation, we have used ethnicity as a proxy. Using the ethnic definitions used by the police, White children make up the largest proportion of all casualties and KSIs on school and other journeys, but there is an over-representation of Black children, compared to the ethnic profile of London (Table 2.7). We considered this to be a risk 'marker' rather than a causal factor and investigated its association with casualty rates using statistical tests (see Chapter 5). In terms of the child population of London as a whole (from the 2001 Census) 60% are White; 23% Black; 12% Asian and 4% Other[32]

Table 2.7 - Profile of Casualties by Ethnicity (2005)

	All casualties		KSIs	
	School	Other	School	Other
All casualties	538	1192	64	176
White	42%	42%	47%	44%
Black	31%	28%	30%	28%
Asian	12%	13%	7%	10%
Other/Not known	16%	16%	17%	18%
Totals	101%	99%	101%	100%

Note: Percentages do not sum to 100 because of rounding

[32] Office for National Statistics, National Census (2001)

2.4 Distance Travelled to School

The Department for Education and Skills (DfES) provided an anonymised extract of the Pupil Census for each pupil in London. This showed the approximate length of their journeys made to school, by any mode, in bands of one mile or 1.6 kilometres (Figure 2.4). Most children live very close to school; 66% travel a distance of less than one mile, or 1.6 kilometres, which is equivalent to a 20 minute walk.

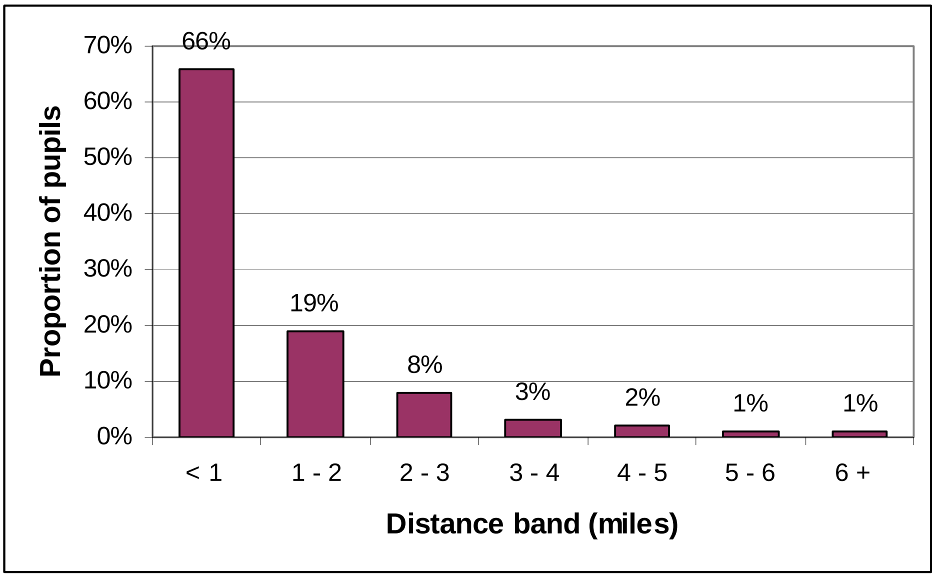


Figure 2.4 – Distance Travelled to School (2005)

We did not know the distribution of distances travelled within each band and so we have used the mid-value (for example, 1.5 in the 1-2 mile band) to investigate variations in the average distance travelled by sex, age and residential location.

In 2005, two thirds of all pupils (66%) travelled a distance of less than one mile to their school (1.6 kilometres), and just 7% travelled more than three miles (4.8 kilometres). Boys and older pupils tend to have longer journeys: 66% of boys' journeys are longer than one mile (or 1.6 kilometres) compared with 65% of girls' journeys, and 52% of 11-12 year olds boys' journeys exceed this distance while the proportion among 5-10 year olds is 19%.

Pupils in the Outer London boroughs live further from school than those in Inner London boroughs. The proportions who travel more than one 1 mile (or 1.6km) are 35% and 32%, respectively. Our analysis also showed that pupils in South London travel further than those in any other sector (Figure 2.5 overleaf).

Distance Between Home, Collision and School

The ACCSTATS collision records show that injuries are sustained at varying distances between home and school. Journey distances were calculated from ACCSTATS records in terms of crow-fly distance between the recorded postcodes for home and school. The mean for all casualties is 1.13 miles (or 1.8km) from home and 1.19 miles (or 1.9km) from school, but half of those injured are involved in collisions less than 0.63 miles (or one kilometre) from home and school (Table 2.8). Collisions involving child pedestrians occur, on average, nearer to the childrens' home and school locations than those involving children using other transport modes.

These distances vary with age and sex, as older children tend to travel further than primary school aged pupils and boys tend to travel further than girls.

Figure 2.5 - Percentages of Pupils that Live within 1.6 kms (1 Mile) of their School (2005)

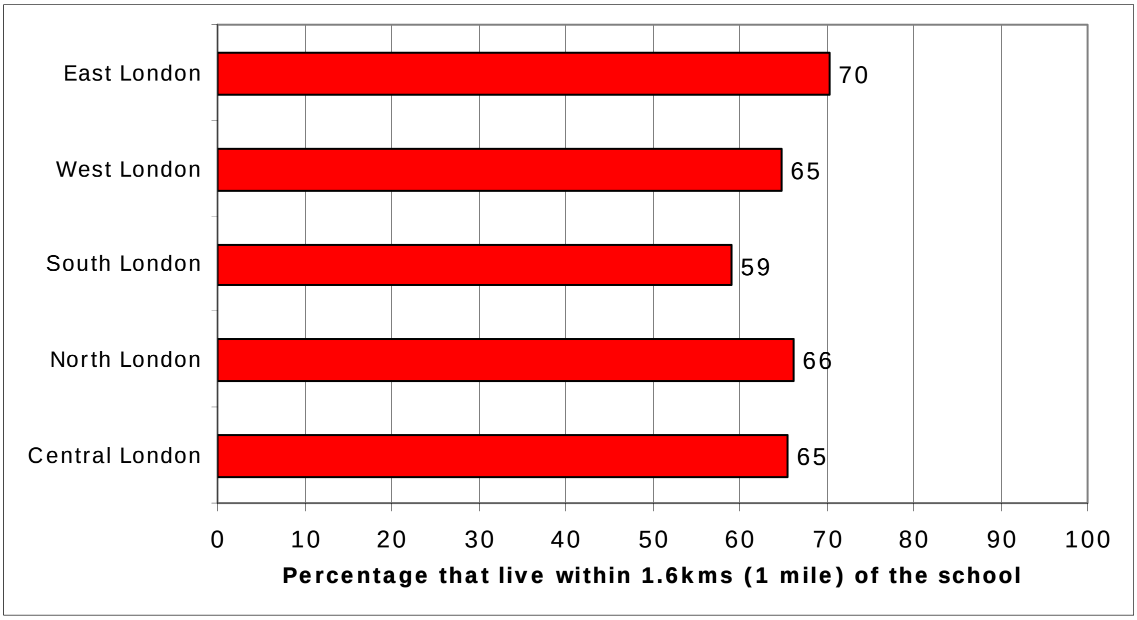


Table 2.8 – Distance between Home, Collision and School (2001-2005)

	Distance between home and collision (metres)		Distance between school and collision (metres)	
	Mean	Median	Mean	Median
All casualties	*1776*	*974*	*1900*	*701*
Pedestrian casualties	1683	846	1732	582
4 to 10	1283	590	1931	519
11 to 12	2068	1135	1924	746
13 to 15	1978	1378	1847	862
Boys	1789	1014	2001	700
Girls	1759	935	1769	702

3 Have Casualties Fallen Over Time?

3.1 Method

Approach

Since the late 1990s there were significant improvements in child road safety in London, with notable reductions in KSIs, and some decline in slight injuries. With the on-going investment in road safety education and training, and the implementation of remedial measures and 20mph zones around schools, we would expect this trend to have continued.

The following section provides an overview of the more recent changes in child casualties to understand the progress that is being made towards the London target of reducing child KSIs by 60%, against the 1994-98 baseline, by 2010.

We then go on to investigate the comparative progress on school and other journeys, and see how this has differed for users of the different transport modes, and for children in different demographic and ethnic groups.

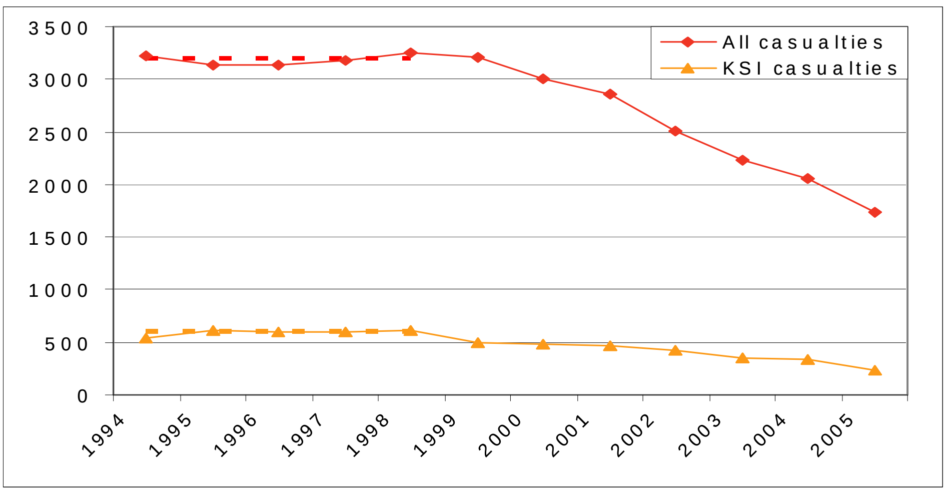
Data Source

The analysis has relied on the edited extract of the ACCSTATS dataset, which was described in Chapter 2. The entire dataset contains 33,350 school aged casualty records for the period 1994 to 2005.

3.2 Trends in School Aged Casualties

Since 1998 there has been a clear downward trend in school aged casualties, as shown in Figure 3.1. By 2005, all casualties have fallen by 46%, compared to the 1994-98 baseline (shown in a dotted line). KSIs have dropped by 60% - already meeting the London 2010 target.

Figure 3.1 –Trends in School Aged Casualties



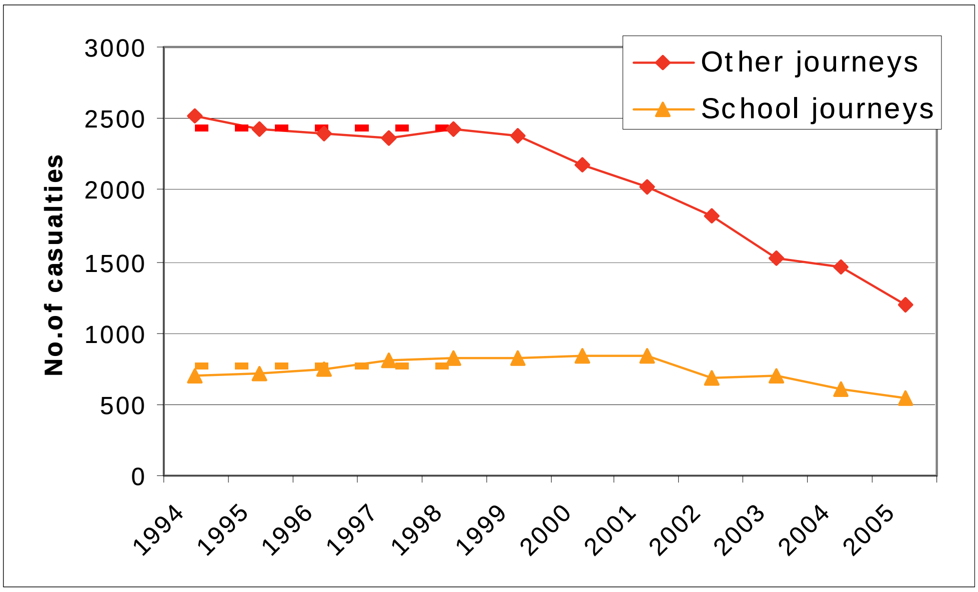
Dotted line shows 1994-1998 baseline average

Mirroring this overall trend, there have been falls in the number of injuries occurring on both school and other journeys (Figure 3.2).

Casualties on school journeys have been consistently fewer than those on other types of journey, throughout the period, and they have fallen by 41% compared with the baseline. While KSIs on school journeys have been declining substantially (-57%), there has been less improvement in slight injuries (-22%).

The fall in casualties on other journeys has been much sharper, dropping by 51% compared to the baseline, largely due to significant falls in the number of KSIs (-61%) and slight injuries (-49%).

Figure 3.2 – Trends in All Casualties on School and Other Journeys



Dotted line shows 1994-1998 baseline average

The proportion of children walking to school has declined alongside the switch to car and bus (Table 3.1). We have already shown that fewer injuries occur on these modes (Section 2.3), and so some of the casualty savings have come from the fall in children's exposure to risk.

Table 3.1 Percentage Change in Main Mode for School Travel in London

	Car	Bus	Walk
From 1998-2000 to 2003-2004	+5%	+7%	-11%

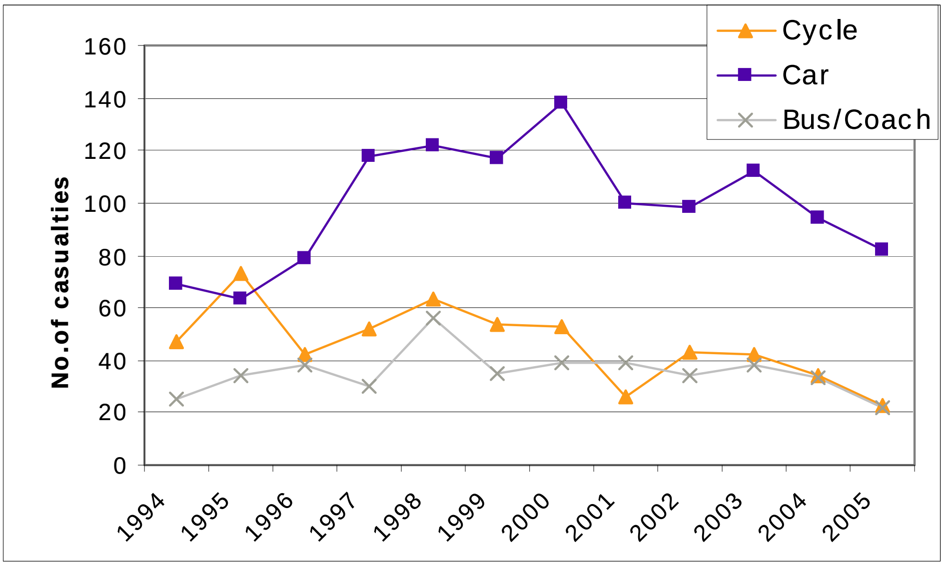
Source: DfT, National Travel Survey

The switch from walking has been greatest amongst primary schoolchildren, possibly because of heightened concerns about young children's safety and security, and it is these who have seen the greatest fall in casualties, compared to the other age groups (see Section 3.3).

There has also been a fall in cyclist casualties (Figure 3.3). Whilst this is small, it is important, as more children are now cycling (particularly older children, as noted in section 1.3) and this is being encouraged in School Travel Plans.

In contrast, child car passenger casualties have fluctuated and increased slightly overall (by 9%) and casualties amongst bus users have remained steady, but at a low base.

Figure 3.3 – Trends in All Non-Pedestrian Casualties on School Journeys



3.3 Effect of Demographic Factors

There is some variation in the proportional decrease in casualties between sex and age. In particular, the decline in casualties on other journeys has affected boys and girls equally, however, the decline on school journeys has been significantly greater amongst the boys (Table 3.2).

Table 3.2 Changes in Casualties by Sex and Age

	School journeys	Other journeys
Boys	-32%	-51%
Girls	-26%	-51%
4-10 years	-38%	-55%
11-12 years	-27%	-48%
13-15 years	-20%	-45%

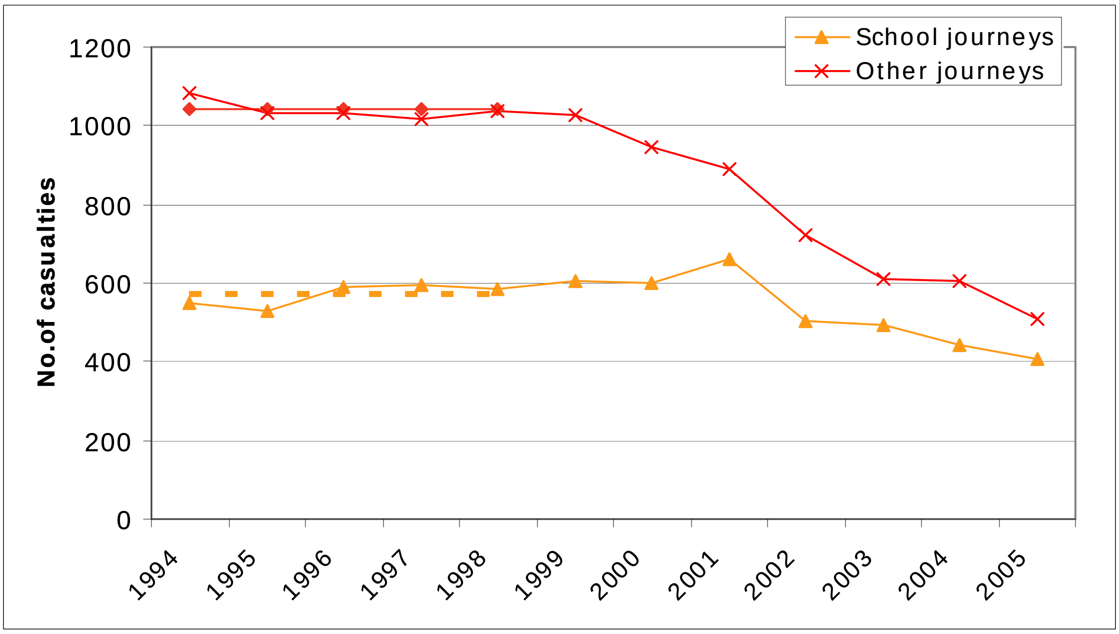
Note: Figures compare 2005 against the 1994-98 baseline

As Table 3.2 also shows, the fall in casualties on school journeys has affected all the age groups. The youngest children have seen the greatest change (falling 38% against the 1994-98 average), but there have also been significant declines amongst 11-12s (-27%) and 13-15s (-20%). Again, these changes may be related to different levels of exposure to injury risk, particularly because of the different mix of modes used. We previously saw (in Figure 1.1) that 5-10 year olds more often walk to school than do older children, and children in this age group are more than twice as likely to be driven to school.

The proportional fall in all casualties amongst boys has exceeded the girls (-32%, compared to -26%) but they continue to have more injuries, and more severe injuries, than girls.

Figure 3.4 – Trends in Pedestrian Casualties on School Journeys and Other Journeys

Dotted line shows 1994-1998 baseline average



Combining the age and sex data, we can see that it is the youngest girls and boys that have experienced the greatest improvement in road safety on school journeys (Table 3.3).

There has been less improvement with the oldest girls (-9%). Changes in casualties among older girls may be related to behaviour, exposure and possibly their greater car use (Section 2.3), since (as Figure 3.3 showed) injuries amongst child car passengers generally have risen.

Table 3.3 Changes in All Casualties on School Journeys

	4-10s	11-12s	13-15s
Boys			
Casualties in 2005	101	109	91
Change since 94/98	-37%	-28%	-29%
Girls			
Casualties in 2005	72	76	89
Change since 94/98	-38%	-27%	-9%

Note: Figures compare 2005 against the 1994-98 baseline

3.4 Ethnicity

Comparing casualty trends between the ethnic groups, White children comprise the largest group (55% of all casualties on school journeys where ethnicity is known) and casualties on their school journeys have fallen by 47% against the 1995-98 baseline[33]. This includes a significant fall in KSIs (-66%). There has also been a decline in casualties amongst Asian children (-32%) as shown in Table 3.4, but the dataset is too small to identify a robust trend in KSIs. In contrast, casualties amongst Black children have risen from 20% to 31% of all casualties on school journeys where ethnicity is known between 1995 and 2005. This is not explained by changes in the Black 4-15 population[34], and research indicates that it may not be linked to differences in deprivation across ethnic groups or to more walking[35]. The overall trend is a decrease in casualties, of 10% among Black children.

Table 3.4 Changes in Casualties on School Journeys by Ethnic Group

	White	Black	Asian
Casualties in 2005	225	167	64
Change since 95/98	-47%	-10%	-32%

Note: Figures compare 2005 against the 1995-98 baseline

[33] Collection of casualty information began in 1995

[34] The population of Black children aged 4-15 as a percentage of all 4-15 children in London rose by about 1.5 percentage points between 2000 and 2005, from 18.9% to 20.5%, and the Black 4-15 population actually declined by 3%. Source: GLA (2005) Round Interim Ethnic Group Projections Sc8.07.

[35] Steinbach et al (2007): Road Safety of London's Black and Asian Minority Ethnic Groups.

4 What Circumstances Contribute to Collisions?

4.1 Method

Approach

This section considers the circumstances that have contributed to collisions involving schoolchildren in London. We have grouped them according to:

- **When** collisions are more likely to occur, in terms of time of day and time of year;
- **What weather and road conditions** are associated with collisions because of their affect on visibility and braking distances;
- What features of the **road environment** are linked with high numbers of collisions;
- Which **vehicle manoeuvres and types of driver** are involved; and
- Which '**contributory factors**', according to police reports, may have led to or in some way contributed to collisions.

The research has been largely exploratory, making use of the data collected on STATS 19 for the most recent five-year period (2001-2005).

Data Sources

The main source of data used for this analysis is the edited extracts from the ACCSTATS dataset. These comprised 3,364 records of collisions involving children aged 4-15 years making journeys to or from school, on a weekday between 7am and 6pm during term time, and a further 8,014 records of collisions involving school-aged children making journeys for other reasons.

The results require caution in interpretation that always applies to findings based on STATS 19 records, since these are based on the observations and reports made by police attending the collision, which inevitably involve some degree of judgement. Particular reservations apply to the 'contributory factors' which rely heavily on reporting officers' subjective judgements. These factors reflect the reporting officers' opinions at the time of reporting and may not be the result of extensive investigation.

This section considers the circumstances that have been reported as contributing to collisions that involved child casualties. Collisions often involve more than one casualty. The records of 9825 collisions recorded in our database extract for 2001 – 2005 indicate that for every one hundred collisions that involved a schoolchild casualty, there was a total of 181 casualties including 116 to school children. Of those that were not school children we do not know how many were drivers or other adults involved.

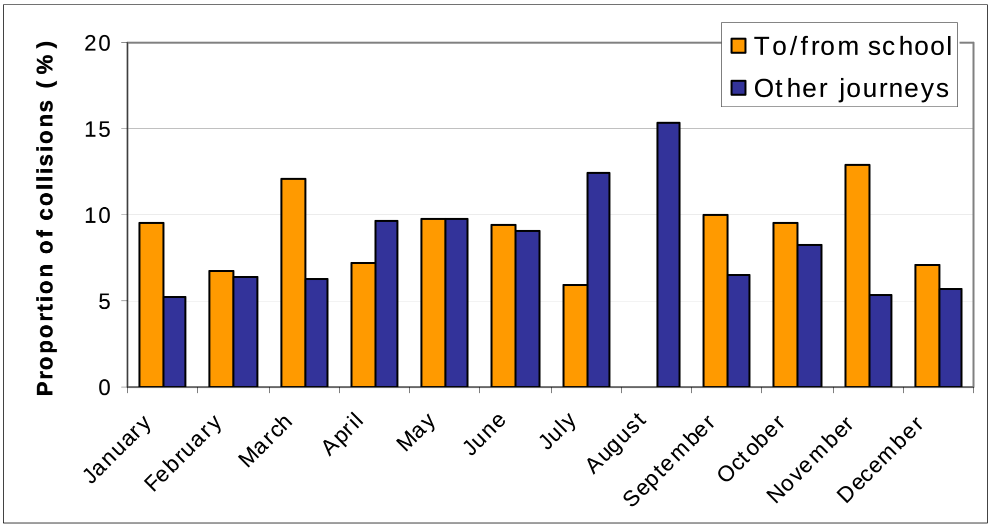
4.2 Time of Day and Time of Year

Previous research into child pedestrian fatalities in England and Wales[36] found that more fatalities occur in October than any other month, possibly because the autumn weather allows walking, but the evenings are dark.

The pattern of collisions involving schoolchildren in London (using all modes) is different, as shown in Figure 4.1. The spread of collisions on school journeys is concentrated in two peaks; one in November when the nights draw in and many children are travelling home in the dark, and the other between March and June, when mild weather and long daylight hours may encourage more children to walk and to combine school travel with play activities.

By contrast, collisions on other journeys peak in the summer months, around August, when days are long and children spend more time outside, potentially exposed to traffic.

Figure 4.1 – Spread of Collisions by Month (2001-2005)



Nearly all collisions on school journeys (94%) happen during daylight, and this is consistent across all modes (Table 4.1). The few (6%) that occur in the dark tend to be in the winter months (79% in November, December and January) and on the journey home from school (91% between the hours of 1500 and 1800).

Most collisions on other journeys also occur during daylight, but the percentage in dark conditions is higher than for school journeys (29%). October includes half term, while there are no school holidays in November which may explain the higher number of casualties on school journeys made in November. Similarly, Easter moves between March and April (between 2001 and 2005 Easter was in April for three out of the five years).

[36] Sentinella J., Keigan,M. (2004) Young adolescent pedestrians' and cyclists' road deaths: analysis of police accident files, Department for Transport, London.

Table 4.1 – Incidence of Collisions in Daylight or Dark (2001-2005)

	All casualties		Pedestrians		Car Passengers		Cyclists	
	School journeys	Other journeys	School journeys	Other journeys	School journeys	Other journeys	School journeys	Other journeys
No of collisions	*3216*	*7374*	*2446*	*3262*	*428*	*2396*	*165*	*1128*
Daylight	94%	71% *	94%	73% *	95%	63% *	96%	81% *
Dark	6%	29% *	6%	27% *	5%	37% *	4%	19% *

Note: * indicates difference in school and other journeys is significant at the 95% level.
Significant differences were identified by using chi squared test.

More collisions occurred on children's journeys home from school (46%, between 1500 and 1659) than on journeys to school (36%, between 0700 and 0859), as shown in Table 4.2. However, there are important variations between modes; more collisions involving pedestrians occur on the journey home, whilst more collisions involving car passengers and cyclists occur on the journey to school, possibly because of time pressures.

Table 4.2 – Time of Day of Collisions leading to Child Casualties (2001-2005)

	All casualties		Pedestrians		Car Passengers		Cyclists	
	School journeys	Other journeys	School journeys	Other journeys	School journeys	Other journeys	School journeys	Other journeys
No of collisions	*3216*	*7374*	*2446*	*3262*	*428*	*2396*	*165*	*1128*
Before 0700	0%	2% *	0%	1% *	0%	4% *	0%	2% *
0700 to 0859	36%	2% *	34%	1% *	43%	2% *	45%	2% *
0900 to 1459	13%	29% *	13%	27% *	14%	33% *	10%	28% *
1500 to 1659	46%	17% *	48%	19% *	36%	13% *	40%	20% *
1700 to 1859	5%	16% *	5%	17% *	7%	13% *	5%	18% *
After 1900	0%	35% *	0%	36% *	0%	35% *	0%	30% *

Note: * indicates difference in school and other journeys is significant at the 95% level.
Significant differences were identified by using chi squared test

These findings match the DfT's study of child pedestrian fatalities[37], referred to above, which found that fatalities tend to peak in the late afternoon when children are more likely to be walking home from school, and to be walking in darkness, especially in autumn and winter months. Additional reasons put forward for similar findings within other studies[38] include: children being more likely to spend longer on homeward journeys; to be travelling in the company of other children; and to engage in play, increasing their exposure to risk.

A DfT national study (DfT 1999) found that injuries sustained when using buses tend to occur at the end of the school day as younger teens jostle for a place at the front of the queue at the bus stop and fall in front of an on-coming bus (DETR, 1999). There are too few bus passenger casualty reports in ACCSTATS to investigate whether the same is true in London.

4.3 Road Conditions

Poor weather creates hazardous road conditions which can lead to collisions. We considered that wet weather, in particular, would reduce visibility and increase braking distances thereby increasing the risk of collision. There are typically 11-15 'wet days' per month in London[39], but it appears that the large majority of collisions on school and other journeys occur in fine weather (see Table 4.3)[40].

There are some variations between modes; few pedestrians and cyclists are involved in collisions in poor weather, possibly because children avoid being outdoors in such conditions. Differences between school and other journeys may be related to differences in choices of mode according to weather conditions. In particular, other journeys are often more optional in terms of mode and timing, so children may be less likely to make a walking or cycling journey during periods of bad weather, either putting it off or using an alternative mode.

[37] Sentinella J., Keigan,M. (2004) Young adolescent pedestrians' and cyclists' road deaths: analysis of police accident files, Department for Transport, London.

[38] See Bly et al (1999) *op cit*

[39] BBC Weather Centre 2006. 'Wet days' are defined as days with +0.25 mm rainfall

[40] Note here that reported weather conditions rely on police subjective judgements, and for 1% were missing in the ACCSTATS records.

Table 4.3 – Collisions in Different Weather Conditions (2001-2005)

	All casualties		Pedestrians		Car Passengers		Cyclists	
	School journeys	Other journeys	School journeys	Other journeys	School journeys	Other journeys	School journeys	Other journeys
No of collisions	*3216*	*7374*	*2446*	*3262*	*428*	*2396*	*165*	*1128*
Fine weather	87%	88%	88%	91% *	81%	80%	87%	94%
Bad weather	12%	10%	10%	7% *	18%	17%	11%	5% *

Note: * indicates difference in school and other journeys is significant at the 95% level.
Significant differences were identified by using chi squared test

The analysis shows that the combination of wet road surfaces and otherwise dry weather may account for a significant proportion of collisions. For example, 32% of collisions involving children travelling by car to or from school occur on wet roads (Table 4.4), but only 18% happen in bad weather. One possible explanation is that drivers fail to allow for longer braking distances on roads that remain wet after weather conditions have improved.

Table 4.4 – Collisions according to Condition of the Road Surface

	All casualties		Pedestrians		Car Passengers		Cyclists	
	School journeys	Other journeys	School journeys	Other journeys	School journeys	Other journeys	School journeys	Other journeys
No. of collisions	*3216*	*7374*	*2446*	*3262*	*428*	*2396*	*165*	*1128*
Dry surface	80%	83%	81%	87% *	68%	73%	86%	91%
Wet surface	19%	16% *	18%	12% *	32%	27%	14%	9%

Note: * indicates difference in school and other journeys is significant at the 95% level.
Significant differences were identified by using chi squared test

4.4 Road Environment

Collisions involving Child Pedestrians

The vast majority of collisions involving child pedestrians are on single carriageway roads with 30mph speed limits – typical London roads. No collisions occurred on roads recorded as having 20mph limits (section 7.3 reports findings on collisions and the numbers of schools located within 20mph zones).

Many collisions occur where children cross the road away from a crossing facility or in the proximity of a traffic junction, especially a priority junction, as shown in Table 4.5.

Table 4.5 – Location of Collisions

	All casualties		Pedestrians		Car Passengers		Cyclists	
	School journeys	Other journeys	School journeys	Other journeys	School journeys	Other journeys	School journeys	Other journeys
No. of collisions	*3216*	*7374*	*2446*	*3262*	*428*	*2396*	*165*	*1128*
Occurred close to pedestrian crossing	32%	27% *	35%	30% *	16%	27% *	27%	18% *
Occurred close to junction	65%	66%	63%	57% *	73%	76%	77%	70%

Note: * indicates difference in school and other journeys is significant at the 95% level.
Significant differences were identified by using chi squared test.
STATS 19, and therefore, ACCSTATS, records collisions within 20m of a junction and 50m of a pedestrian crossing, but we have not verified the accuracy of these locations.

Where collisions occur in the vicinity of a pedestrian crossings, they are more likely to be at a crossing that forms part of a signalised traffic junction, than at a dedicated zebra or pelican crossing (Table 4.6). Just 1% of collisions on school journeys occur where there is a school crossing patrol in operation.

Table 4.6 – Collisions involving Pedestrians at Crossings and Junctions

	Crossing or Junction	School journeys	Other journeys
No. of collisions		*2446*	*3262*
Pedestrian facility	Zebra crossing	10%	8% *
	Pelican or similar	8%	7%
	Pedestrian phase at traffic signals	15%	13%
Junction type	Signal	13%	12% *
	Priority (T-junction)	49%	45% *
	Roundabout	1%	2%

Note: * indicates difference in school and other journeys is significant at the 95% level.
Significant differences were identified by using chi squared test.
Percentages may not match figures given in Table 4.5 due to rounding.

Crossing roads clearly increases pedestrians' exposure to risk. In particular, adolescents often fail to obey the traffic signals and/or fail to check that the road is clear. In a survey of adolescents by the Transport Research Laboratory[41], nearly 25% reported that they rarely

[41] Elliott M A & C J Baughan (2003). The behaviour of adolescent road users – a survey of 11-16 year olds. TRL Report TRL561. Crowthorne: TRL Limited.

check to make sure the traffic had completely stopped before crossing at a pedestrian crossing, and 25% reported they often get part-way across the road and have to run the rest of the way. Other studies of children's crossing behaviour have also found that reaction to peer pressure has a significant influence on a pedestrian's propensity to cross at a designated crossing[42]. Previous research has also shown that children from poorer backgrounds cross more roads than those from wealthier families, possibly because of urban design, lifestyle patterns and lack of alternative travel modes[43].

Collisions involving Children as Car Passengers

Whilst collisions involving child pedestrian casualties are split 43%:57% between school and other journeys (as shown in Tables 4.1 to 4.4 previously), collisions involving child car passengers are much more frequent on other journeys (with the split 15%:85%). This is surprising since LATS data show that about half (48%) of the car journeys made by children aged 5-16 are school journeys, but may be explained by the fact that other journeys tend to be longer, and may involve driving in an unfamiliar area on faster roads (Table 4.7).

Table 4.7 – Location of Collisions involving Car Passengers

Road Type	**School journeys**	**Other journeys**
No of collisions	*428*	*2396*
20mph roads	1%	0% *
30mph roads	93%	87% *
40mph or faster roads	6%	13% *

Note: * indicates difference in school and other journeys is significant at the 95% level. Significant differences were identified by using chi squared test.

The majority of collisions involving children as car passengers occur close to a junction, often a priority junction (Table 4.8 overleaf). This applies to both school and other journeys.

[42] For example, Daff R, Cramphorn B, Wilson C J & J Neylan (1991). Pedestrian behaviour near signalized crossings (Sydney). Proceedings 16th ARRB Conference, part 4. Also, Yagil D (2000). Beliefs, motives and situational factors related to pedestrians' self reported behaviour at signal-controlled crossings. Transportation Research Part F 3.

[43] Christie, N., (1995) Social, economic and environmental factors in child pedestrian accidents: A research review. Transport Research Laboratory, Project Report 116.

Table 4.8 –Collisions involving Car Passengers at Junctions

Junction detail	School journeys	Other journeys
No of collisions	*428*	*2396*
No junction within 20m	27%	24%
Signal	16%	20%
Priority (eg T-junction, staggered junction, private drive)	47%	41%
Roundabout	7%	8%
Other types of junction	4%	8% *

Note: * indicates difference in school and other journeys is significant at the 95% level.
Significant differences were identified by using chi squared test.

In over half (59%) of the collisions involving car passenger injuries on school journeys, the child was reportedly seated in the front of the car, but for other types of journey most casualties (53%) were in the rear seat. ACCSTATS does not record whether the casualty was wearing a seat belt, but we know that compliance with the legislation is particularly poor in London. A recent study[44] found that 26% of 5-9 year olds in London travel unrestrained in the front seat and 42% are unrestrained in the back seat, compared to 4% and 8% nationally.

Collisions involving Child Cyclists

Between 2001 and 2005, there were 1,293 collisions involving school-aged cyclists in London. Cycling journeys to school can be considered much safer than other types of cycling journey, as 87% of all collisions occurred during non-school journeys. This may reflect the investment in cycle routes and other facilities in the vicinity of schools, and a tendency for other cycling journeys made for leisure and other purposes to cover a variety of roads that do not necessarily have the same types of cycling infrastructure. The vast majority of collisions involving cyclists are recorded as occurring on 30mph roads, and about half of these are on unclassified roads[45]. They tend to occur near junctions, particularly priority junctions. Only 1% of collisions occur in 20 mph zones, and less than 1% are on cycle routes[46]. These patterns all reflect the greater exposure to risk of cyclists making non-school journeys, since (as was noted earlier in Section 1.3) relatively few cycling trips are to or from school.

---

[44] Transport Research Laboratory (2006). *Mobile phone and seat belt usage in London,* report for Transport for London.

[45] Busier roads are classified as either A or B and this designation, followed by a number, is used for as a reference name.

[46] Defined in ACCSTATS as cycle lanes and cycle ways.

4.5 Characteristics of Drivers Involved in Collisions

ACCSTATS records limited information on the behaviour of drivers and how this contributed to a collision. However, it does allow us to identify their characteristics and this may help in planning road safety strategies.

As might be expected, collisions involving a motorised vehicle colliding with a child pedestrian or cyclist casualty generally involve one casualty (the pedestrian or cyclist), whereas those involving a child car passenger casualty typically involve two vehicles and multiple casualties (see Table 4.9).

Table 4.9 - Numbers of Casualties and Vehicles involved in Collisions

Collisions involving:	Pedestrians		Car Passengers		Cyclists	
	School journeys	Other journeys	School journeys	Other journeys	School journeys	Other journeys
No of collisions	*2446*	*3262*	*428*	*2396*	*165*	*1128*
Mean no. of casualties per collision	1.02	1.02	1.14	1.20	1.02	1.02
Proportion involving one motorised vehicle	98%	98%	7%	8%	94%	98%
Proportion involving two or more motorised vehicles	2%	2%	93%	92%	6%	2%

Drivers who collide with a child pedestrian are mostly males (62% on school journeys and 67% on other journeys). These drivers also tend to be White and aged 25-44 (Table 4.10).

The proportion of females is slightly higher on school journeys (29%) than other journeys (23%), whilst the proportions of Black and Asian drivers are slightly higher on other journeys (34%) than school journeys (26%).

There are not enough child cyclists injured to undertake any meaningful analysis of the drivers. However, we know that the characteristics of the drivers involved in collisions between vehicles that lead to a child passenger casualty vary:

- On school journeys, the driver of the car that is carrying the injured child tends to be female (67%) aged 25-44;
- On other journeys, there are slightly more males driving the car with the injured child (53%) than females (46%);
- The drivers of the other cars (ie the cars that do not contain the child that is injured) are mostly males (65% on school journeys and 70% on other journeys).

Table 4.10 also indicates that Black drivers are disproportionately more likely to be involved in any type of collision involving a child casualty, whether the casualty is a passenger in their own vehicle, a pedestrian or a passenger in another vehicle involved in the collision (though there are relatively few cases in the third of these categories within our database extract). While collisions involving White drivers are more likely to injure children making a journey to school, those involving black drivers more often injure children making other types of journey.

Table 4.10 - Profiles of Drivers in Collisions

	Injured Child Pedestrian		Injured Child Passenger in Own Car		Injured Child Passenger in Other Car	
	School journeys	Other journeys	School journeys	Other journeys	School journeys	Other journeys
No. of drivers	*2552*	*2429*	*1042*	*6121*	*329*	*2292*
Under 25	10%	12%	8%	12%	13%	15%
25-44	47%	45%	72%	67% *	49%	44%
45+	24%	24%	18%	17% *	25%	21%
Male	62%	67% *	32%	53% *	65%	70%
Female	29%	23% *	67%	46% *	28%	21% *
White	53%	45% *	53%	48%	62%	48% *
Black	17%	21% *	20%	25% *	9%	18% *
Asian	9%	13% *	17%	16%	8%	10%
Other	2%	2%	3%	2%	1%	1%

Note: * indicates difference in school and other journeys is significant at the 95% level. Significant differences were identified by using chi squared test.

Comparisons are limited by missing information within ACCSTATS and the relatively few collisions involving cyclists, particularly on school journeys.

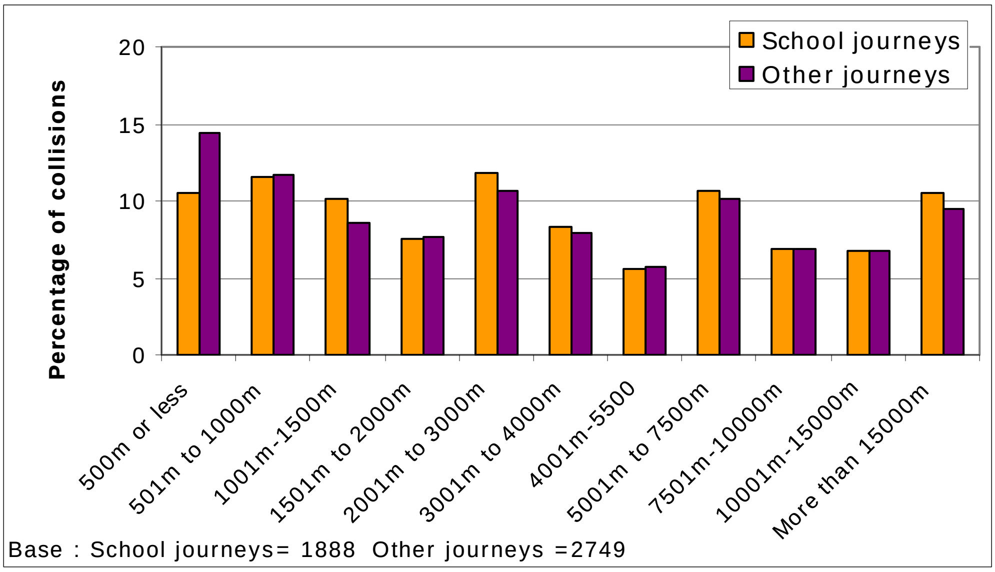
Using the drivers' full home postcode (which is available in about 70% of ACCSTATS collision records) and the Postal Address File (PAF), it is possible to calculate crow-fly distances between drivers' homes and the sites of their collisions. This shows that the drivers of vehicles that collided with pedestrians and cyclists tend to be local residents. Half of them are involved in collisions within 3kms[47] of their home (Table 4.11), and two-thirds have collisions within 5kms of their home (Figure 4.2). There is little difference in the distances from home of collisions on school and other journeys.

[47] 2.7kms is 1.7 miles

Table 4.11 – Distance Between Drivers' Home and Site of Collision with Child Pedestrians and Cyclists (2001-2005)

	All collisions	Collisions on school journeys	Collisions on other journeys
No of collisions	*4637*	*1888*	*2749*
Median	2.71 km	2.87 km	2.62 km

Figure 4.2 – Distribution of Distances between Drivers' Home and Site of Collision with Child Pedestrians and Cyclists (2001-2005)



4.6 Contributory Factors

The collision records in ACCSTATS include a 'contributory factor' identified subjectively by the police as having led to the collision. These refer to circumstances of the collision, and behaviour or (mis)judgements by the parties involved (drivers and child casualties).

It is important to note that the contributory factors reflect the reporting officers' opinion at the time of reporting and may not be the result of extensive investigation. There is a need for particular caution in interpreting the reported contributory factors for collisions involving child pedestrian casualties. This is discussed further later in this section.

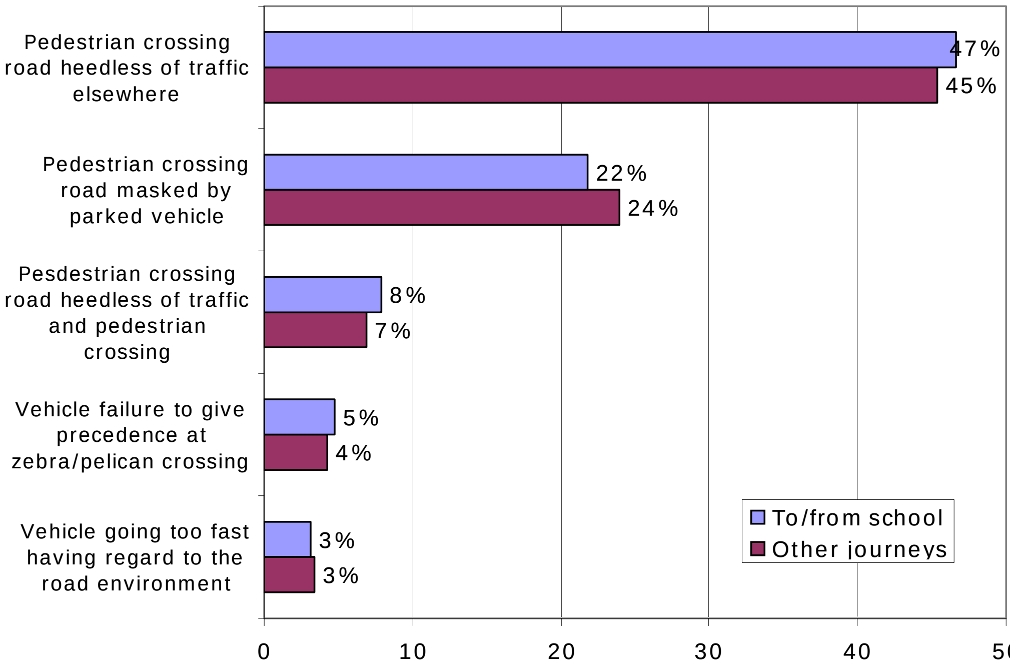
Up to January 2005, police officers identified one contributory factor for each collision. Since then, the officer present at the scene has been able to select up to six factors. There is limited commonality between the two sets of factors, but in some cases it is possible to group the more detailed factors such that they match a single aggregated factor.

In our analysis, we inspected the records for 2005 and selected what we considered to be the one 'main' factor, to achieve consistency with previous years in our 2001-05 dataset. Since there was no ranking of the relative importance of each factor identified in the original data records, the selection was based on rating the factors according to the frequency with which they were mentioned.

Figure 4.2 shows the most frequently recorded contributory factors for collisions involving school-aged children walking, for school journeys and other types of journeys. The key contributory factors recorded are 'crossing the road heedless of traffic elsewhere' (47% on school journeys), 'crossing the road masked by parked vehicles' (22%) and 'crossing the road heedless of traffic and pedestrian crossing' (8%). These factors all relate to actions attributed to the child. The most important factors relating to the driver are 'failure to give precedence at a zebra/pelican crossing' and 'going too fast with regard to the road environment', which together reportedly account for 8% of all collisions involving pedestrians. The pattern for other journeys is very similar.

Figure 4.2 - Contributory Factors for Collisions with Child Pedestrians (2001-2005)

Figure 4.3 shows the most frequently recorded contributory factors for collisions involving

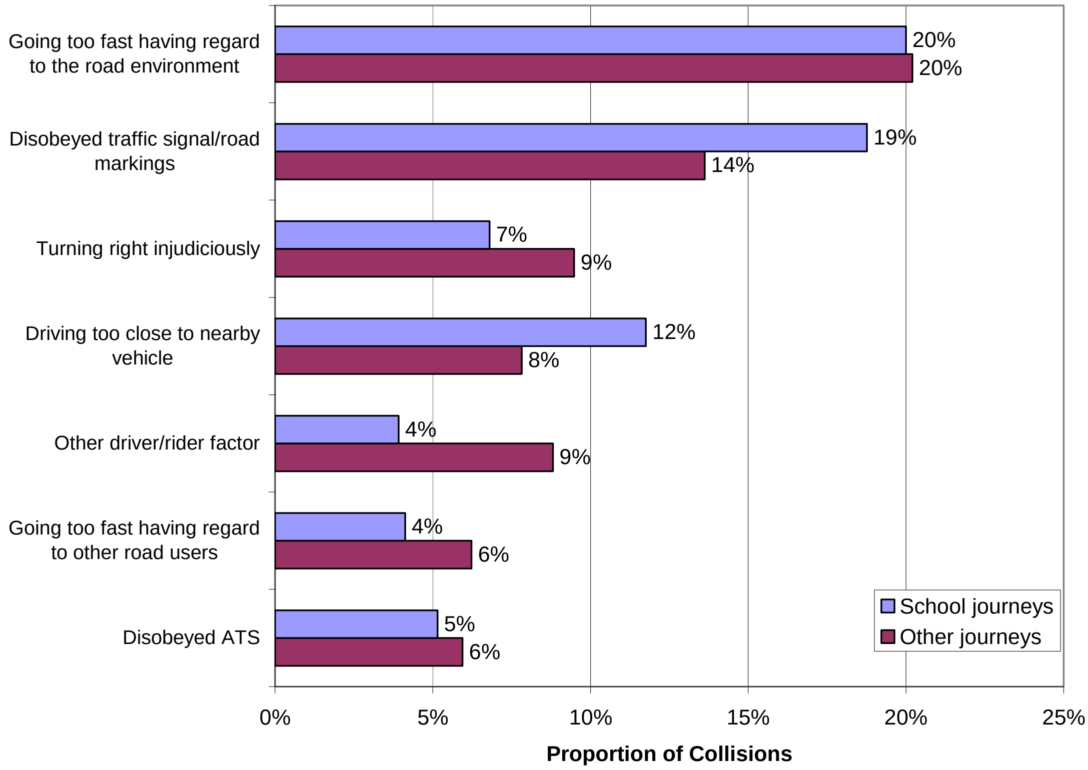


child passengers in cars. The top three factors for collisions involving children being driven to or from school refer to the driver 'going too fast having regard to the road environment' (20% of collisions), 'disobeyed traffic signal/road markings' (19%) and 'driving too close to a nearby vehicle' (12%). These factors are associated with the driver(s) involved, and can be considered to be outside the control of the children injured.

On other journeys, the proportions of collisions caused by drivers disobeying signals or road markings (14%) and driving too close (8%) are lower, possibly because there are fewer time pressures and roads are less congested when these journeys are made.

Figure 4.3 Contributory Factors for Collisions involving Children Car Passengers

For cyclists, the key factor derived from the analysis was a generic term associated with



behaviour of the child cyclists involved in the collisions. This covers all aspects of cycling on and off pavements or across pedestrian crossings, and manoeuvres which may be sudden and not expected or not seen by drivers. This generic factor was reported as contributing to 29% of the collisions involving child cyclists on school journeys, and 34% of those involving child cyclists on other journeys.

Limitations of Pre- and Post-January 2005 Contributory Factors Data

It was previously noted that great caution is needed when interpreting the findings on contributory factors, especially in respect of collisions involving child pedestrian casualties.

The fact that only one factor could be reported pre-January 2005 may tend to introduce a bias, concerning which actions by which of the parties involved (the driver, or the child) contributed more to the collision. This becomes apparent when the pre-and post-2005 classification procedures are compared.

The post-January 2005 classification system allows officers to identify and record actions by more than one of the parties involved that contributed to the collision. This means that if (for example) the child crossed the road heedless of traffic but, in addition, the driver was going too fast to take appropriate avoiding action, both factors can be reported. With the pre-2005 data, however, in cases like these, the actions of the child may be more often reported as the main contributory factor.

The new system also allows officers to record their subjective assessment of the importance of each factor: this is recorded in the data as a probability score.

Some further comparative analysis of the pre and post-January 2005 data could, in principle, help to identify any effect of the change in classification systems on the relative importance of 'pedestrian' and 'driver' factors. Any marked shift in the emphasis given to different factors pre and post-January 2005 could then be taken into account in considering the findings from earlier data. Since, however, the number of collisions post-Jan 2005 is currently too small to support detailed analysis, we recommend that this analysis is undertaken at a future date when there is more data available.

5 Which Groups Are Most At Risk?

5.1 Method

Approach

Previous chapters have considered the overall road safety of children on school journeys, how this has been changing over time and the sorts of factors that can contribute to collisions. We now go onto to consider which groups are most at risk of injury by comparing casualty rates, expressed as a proportion of the relevant population.

Casualties have been grouped by mode, as this has already been shown to be a key determinant of injury risk. We have also investigated age, sex and ethnicity, as we know that there are important variations between children with different personal characteristics. Socio-economic factors would also be a key consideration here, as they affect how children travel, their attitudes towards safety, and the relative safety of the places they travel through. As data for deprivation is not available at the individual level, we have investigated this at the school level using free school meals as a proxy measure.

Data Source

The starting point for this analysis was the edited extract of the ACCSTATS dataset containing all casualties from 1994-2005 and GLA population data describing the number of children resident in London and within each borough broken down by age, sex and ethnicity.

Whilst the general trend is a decline in the number of casualties each year, the charts in the previous chapter demonstrate that there have been large fluctuations within certain modal and demographic groups. Rather than considering the most recent year, we 'smoothed' the data by aggregating several years of records, between 2001 and 2005.

However, there are some incompatibilities between our datasets for other journeys; in particular, LATS journeys are recorded during term-time weekdays, whereas the casualties can occur on weekends and school holidays. Therefore the casualties per trip figures will be higher than the true rates. Nevertheless they can be used to compare the relative risk between one mode and another.

Data Manipulation

We have focused on the period 2001-2005 since:

- Annual casualties vary through the 90s, but tend to be more uniform post 2000/2001;
- The 2001 Census provided an accurate picture of the population and a consistent base for future year forecasts.

To help explain differences in casualty rates by mode, we have also considered the number of journeys made by each mode. Trip rates were derived from the LATS 2001 Household Survey which differentiates between journey purposes and so we were able to extract education and other journeys.

Casualty rates were calculated for the borough in which the casualty resided (ie the 'home' borough). However, the completeness of the home postcode coding in ACCSTATS varied between years, as shown in Table 5.1, and between boroughs. This ranged from below 20% in Richmond, Kingston and Camden to over 70% in Sutton, Bromley and Bexley.

Table 5.1 – Home Postcodes for School Aged Casualties

Year	Complete Postcodes Coded
2001	51%
2002	54%
2003	58%
2004	61%
2005	64%

Further examination showed that there has been a slow but steady increase in the completeness of the postcodes; from 51% in 2001 to 64% in 2005 for school journey casualties, and from 50% to 63% for casualties on other journeys.

There was no evidence that the completeness of coding was affected by the characteristics of the casualty. For example, 58% of 4-10 year olds, 57% of 11-12 year olds and 58% of 13-15 year olds had home postcodes amongst school journey casualties.

It was therefore necessary to 'impute' the distribution of home postcodes for casualties where this was missing, taking into account the borough where the collision occurred. To ensure that the correct numbers of casualties were retained for each table, the total casualties with unknown home boroughs were distributed between boroughs in the same proportions as those whose home boroughs were known. The detailed results are shown in Appendix D, Section 2.

In a minority of cases, none of the casualties within a particular category had a home postcode coded. Therefore it was necessary to impute the distribution using the breakdown for the same borough in another category. For example, in Kingston there were 10 casualties aged 4-10, none of whom had home postcodes. However, the distribution of postcodes for casualties aged 11-12 was available and was used to distribute these 10 casualties.

The estimated distribution of casualties for 2001-2005 was compared with the average annual child population in each home borough to calculate a five-year casualty rate per 1000 children[48]. This produces a 'per capita' casualty rate (and it is important to note that this does not take control for any differences in the exposure of children in different boroughs, including for example any differences in their journey distances). We have retained these five-year rates, and not divided through by five to calculate an annual rate, for ease of presentation.

[48] Population breakdowns were not available for 2005 and so the average has been calculated for 2001-2004.

In view of the imputation procedures involved, the casualty rates for the boroughs that had low proportions of home postcodes will therefore be less reliable than for the other boroughs. In particular, Kingston and Merton had less than 25% of postcodes coded for school journeys, and these plus Camden and Richmond had less than 25% for other journeys. Details of the proportions coded by borough are given in Appendix A.

5.2 Mode of Travel

Fewer children are injured on school journeys than on other journeys (Table 5.2). The casualty rate is significantly lower for each modal group, with the exception of bus users who have particularly low casualty rates on school and other journeys.

Pedestrians comprise the largest modal group within the ACCSTATS casualty dataset (75% of casualties on school journeys and 42% on other journeys) and so we anticipated that they would have the highest casualty rate per population. It is important to note here that casualty rates per unit of population do not take account of different levels of exposure and injury risk among the different modal groups.

The casualty rate for child pedestrians on school journeys is 2.34 injuries per 1,000 school-aged residents, compared to 3.04 per 1,000 population for non-school journeys. This means that children walking to or from school are one-fifth less likely to be injured than those walking for other purposes.

This comparison does not control for any differences in exposure between the two types of journey, resulting (for example) from shorter distances travelled to school. The lower casualty rates for school journeys may nevertheless reflect such factors as the role of LEAs and parents in assessing the routes to be used for school journeys, and the investment in remedial measures to improve the pedestrian environment in the vicinity of schools.

The rate ratio for children who travel by car is even more remarkable in that school journeys are five times safer than other journeys. Again, this possibly reflects factors including the short distances driven to school, parents' familiarity with the route, established routines and peak period traffic congestion slowing vehicular speeds.

Table 5.2 – Casualty Rates per 1000 Population by Mode (2001-2005)

	School Journeys		Other Journeys		Rate Ratio	
	Casualty rate per 1,000 population	95% Confidence Limits	Casualty rate per 1,000 population	95% Confidence Limits	School/Other	95% Confidence Limits
Pedestrians	2.34	(2.06, 2.61)	3.04 *	(2.73, 3.35)	0.77	(0.70, 0.84)
Cyclists	0.16	(0.11, 0.21)	1.08 *	(0.94, 1.22)	0.15	(0.06, 0.23)
Car passengers	0.45	(0.37, 0.52)	2.4 *	(2.13, 2.68)	0.19	(0.16, 0.21)
Bus passengers	0.15	(0.11, 0.19)	0.23	(0.17, 0.29)	0.65	(0.00, 1.58)
Other	0.04	(0.02, 0.05)	0.34 *	(0.26, 0.42)	0.12	(0.00, 0.21)

Note: Five-year casualty rates per 1000 population. * indicates that the confidence intervals do not overlap and so the difference in casualty rate for school and other journeys is significant at the 95% level.

Boy pedestrians are most at risk; with a casualty rate of 2.62 injuries per 1,000 school-aged boy residents, they are 28% more likely to be injured than girls on school journeys (Table 5.3). This is a notable difference, but the confidence intervals overlap, so it cannot be considered statistically significant.

The difference is even greater on other journeys where boys are more than 50% more likely to be injured than girls and this is significant at the 95% confidence level.

Table 5.3 – Casualty Rates per 1000 Population for Pedestrians by Sex (2001-2005)

	School Journeys		Other Journeys		Rate Ratio	
	Casualty rate per 1,000 population	95% Confidence Limits	Casualty rate per 1,000 population	95% Confidence Limits	(School/Other)	95% Confidence Limits
Boys	2.62	(2.21, 3.03)	3.69 [1]	(3.23, 4.15)	0.71	(0.61, 0.81)
Girls	2.04	(1.72, 2.36)	2.38 [2]	(2.05, 2.71)	0.86	(0.72, 0.99)
Rate ratio (Boys/girls)	1.28	(1.06, 1.51)	1.56	(1.23, 1.87)		

Note: Five-year casualty rates per 1000 population. [1] indicates that the difference in the casualty rate for school and other journeys is significant at the 95% level. [2] indicates that the difference in the casualty rate for boys and girls is significant at the 95% level.

Whilst pedestrians have the highest casualty rate, this does not mean that walking is the most dangerous way of travelling, as the rates above do not take account any measure of exposure, and there will be differences in trip rates for different modes.

Walking is used for more journeys than any other mode. To allow for this, we can consider the number of casualties per 1,000 recorded walk trips made to school, rather than per 1,000 population. Casualty rates based on walk trip data obtained from the LATS 2001 Household Surveys (in Table 5.4) show a reduced difference in injury risk between walking and motorised modes.

There are 3.13 child pedestrian injuries per 1,000 walk trips to school. The rate for non-school journeys is almost three times higher, at 9.03 injuries per 1,000 walk trips (Table 5.4). These rates of pedestrian casualties are three times higher than the equivalent casualty rates calculated for car passenger trips, and nearly five times higher than that for bus trips. The rate ratio for walk compared with bus casualties would, moreover, probably fall further if we were able to include walk stages (ie walk parts of multi-modal journeys), and this would also provide a more complete picture of the amount of walking.

Using these trip-based indicators of risk, cycling appears the most risky mode, since child cyclists have 27.6 more injuries per 1,000 trips than bus users, and nearly six times more than pedestrians – though, as noted, casualty rates for walk trips would be reduced if all walk stages of trips involving other modes were included in the calculation. The relatively high rate of casualties for cycling trips must nevertheless give cause for concern, and it underlines the importance of cycle training, safety campaigns, cycle routes and other measures to protect these vulnerable road users.

Table 5.4 – Casualty Rates per 1000 Trips by Mode (2001-2005)

	School Journeys		Rate Ratio	Other Journeys		Rate Ratio
	Casualty rate per 1,000 population	95% Confidence Limits	Compared to bus	Casualty rate per 1,000 population	95% Confidence Limits	Compared to bus
Walking	3.13	(2.76, 3.51)	4.74	9.03	(7.73, 10.33)	3.11
Cycling	18.19	(12.36, 24.02)	27.56	48.56	(40.68, 56.45)	16.74
Car passenger	0.99	(0.83, 1.16)	1.50	4.99	(4.28, 5.71)	1.72
Bus passenger	0.66	(0.49, 0.82)		2.9	(2.11, 3.69)	-

Note: Five-year casualty rates per 1000 trips. Differences in the definition of other journeys does not support comparison between school and other journeys, but does permit comparisons between modes for particular journey purposes. Confidence limits cannot be produced for the rate ratios because variability over boroughs is not known.

5.3 Demographic Factors

Age and Sex

Our analysis of casualty rates per 1,000 population by age and sex groups for school journeys shows that boys have a significantly higher casualty rate than girls (Table 5.5).

The boys' rates are higher than the girls' in each age group, though there are some overlaps in the confidence limits (Table 5.6).

Table 5.5 – Casualty Rates per 1000 Population for School Journeys using all modes, by Sex (2001-2005)

Sex	Casualty Rate per 1,000 population	95% Confidence Limits	Rate Ratio (Boys/Girls)	95% Confidence Limits
Boys	3.52	(3.22, 3.82)	1.3	(1.08, 1.49)
Girls	2.73 *	(2.38, 3.08)	-	-

Note: Five-year casualty rates per 1000 population for school journeys. * indicates that the difference in the casualty rates for boys and girls is significant at the 95% level.

mvaconsultancy

The differences between the age groups are significant, as can be seen from the 95% confidence limits for the rate ratios. The highest rate is 7.17 casualties per 1,000 population for 11-12 year old boys - more than three times the rate for 4-10 year old boys.

Table 5.6 – Casualty Rates per 1000 Population for School Journeys using all modes, by Age (2001-2005)

Sex	Age	Casualty rate per 1,000 population	95% Confidence Limits	Rate Ratio (compared to 4-10 group)	95% Confidence Limits
All	4-10	1.80*	(1.58, 2.02)	-	-
	11-12	6.32*	(5.63, 7.02)	3.5 *	(2.97, 4.05)
	13-15	4.19*	(3.76, 4.63)	2.3 *	(2.03, 2.63)
Boys	4-10	2.06*	(1.80, 2.33)	-	-
	11-12	7.17*	(6.23, 8.10)	3.5 *	(2.41, 4.54)
	13-15	4.52*	(4.05, 5.00)	2.2 *	(1.37, 3.01)
Girls	4-10	1.53*	(1.23, 1.82)	-	-
	11-12	5.44*	(4.59, 6.30)	3.6 *	(1.72, 5.41)
	13-15	3.84*	(3.29, 4.39)	2.5 *	(1.15, 3.88)

Note: Five-year casualty rates per 1000 population for school journeys. * indicates that the difference in the casualty rates between age groups is significant at the 95% level.

The casualty rates for other journeys are generally higher than for school journeys and the rates increase steadily with age, so that those for 13-15 year olds are the highest of all, in contrast with those for school journeys, where it is the 11-12 year olds (see Appendix B).

Ethnicity

It is not possible to identify ethnic differences in casualty rates for each different transport mode, as there are too few trips by other (non-pedestrian) modes to support these detailed comparisons. It is, however, possible to consider ethnic differences in respect of walk trips, and the remainder of this section therefore focuses exclusively on casualty rates among child pedestrians.

Table 5.7 compares casualty rates per 1,000 population for school and non-school journeys across different ethnic groups, focussing on walk trips. Children from all ethnic groups are significantly safer on school journeys than other journeys. Casualty rates for school journeys are typically half those for other journeys across all ethnic groups, as indicated by the rate ratios in Table 5.7.

Using these measures of risk, Black children appear least safe, having a higher risk of injury than children from other ethnic groups on both school and other journeys. They are twice as likely to be injured as White children and nearly three times as likely as Asian children. However, as was noted earlier with reference to the literature review findings, these comparisons do not take into account links between ethnicity and deprivation, which may be a key explanatory factor. Moreover, there is no difference in the ratio of their injury rates for school vs. non-school journeys.

Table 5.7 Casualty Rates per 1000 Population for Pedestrians by Ethnicity (2001-2005)

	School Journeys		Other Journeys		Rate Ratio	
	Casualty rate per 1,000 population	95% Confidence Limits	Casualty rate per 1,000 population	95% Confidence Limits	(School/Other)	95% Confidence Limits
White	2.34	(2.06, 2.63)	5.49 [1]	(4.83, 6.15)	0.43	(0.37, 0.49)
Black	4.93 [2]	(4.32, 5.54)	10.24 [1,2]	(9.22, 11.27)	0.48	(0.42, 0.54)
Asian	1.74 [2]	(1.46, 2.01)	4.35 [1]	(2.02, 6.69)	0.40	(0.16, 0.64)
Other	1.56	(0.81, 2.31)	4.18 [1]	(2.80, 5.55)	0.37	(0.07, 0.68)

Note: Five-year casualty rates per 1000 population. [1] indicates that the difference in the casualty rate for school and other journeys is significant at the 95% level. [2] indicates that the difference in the casualty rate for White children and other groups is significant at the 95% level.

6 Does Safety Vary Between Schools?

6.1 Method

Approach

This section investigates whether there are differences in safety between schools in London in terms of casualty-rates, measured by the number of casualties per enrolled pupil; and which characteristics of schools might influence their safety record.

In Chapter 5, we considered casualty-rates measured by the numbers of casualties per child, and Appendix B, Tables B8-B13, compares casualties per 1,000 child populations across individual boroughs. When these casualty rates were related to the characteristics of children (across London as a whole) the highest rates were for boys and for older children, and for child pedestrians, rather than passengers of cars or other types of vehicle.

A particular drawback in calculating this type of casualty rate at the Borough level (as in Appendix B) is that the child casualties' boroughs of residence were known in only about 50% of cases, so that in half the cases the home borough had to be derived by imputation. Comparisons of casualties on school journeys *per school* are not subject to the same limitation, since in about 90% of cases, these could each be assigned to identified schools. We can therefore have more confidence that the derived school-based casualty-rates are reliable. As with the earlier analyses, the casualty rates reported in this section are based on all severities, including both slight and serious injuries and fatalities.

Data Sources

The main data source was the casualty data for school age children aged 4-15, obtained from ACCSTATS. Amongst these we identified cases where the child was on a journey to or from school and in 90% of cases the relevant school could be identified. The remaining 'unassignable' casualties were excluded from the analysis.

Data were also received from the DfES Schools Census: there are 3155 schools on the database. Some of these were very small (eg Pupil Referal Units) and some data were also obtained on other schools not on the DfES list and so 2850 schools have been used in the analysis based upon 2005 data.

In order to provide sufficient numbers of casualties for the analysis, and in particular to minimise the number of cases where a school had no casualties at all, casualty totals were assembled over the five year period, 2001-2005. With five years' data, the mean number of casualties per school is 0.95, although some 60% had no reported casualties on school journeys (Table 6.1).

Table 6.1 – Schools with Pupils Injured on School Journeys (2001-2005)

Number of Casualties	Proportions of Schools	Number of Schools
0	61%	1736
1	20%	572
2	8%	228
3	4%	114
4	3%	86
5	2%	57
6 or more	2%	57
Total	100%	2850

Data on the characteristics of individual schools were assembled from several different sources, as shown below. The data described the type of school, its level, and the make-up of its pupils in terms of age, sex and ethnicity and entitlement to free school dinners (as a measure of deprivation). They were available for each year, but this analysis is based on each school's characteristics in 2005, since this ensured that the results would relate as closely as possible to the characteristics of schools as they exist now.

From the DfES annual School Census, we obtained information on:

- School type: categories being academy, City Technology College or foundation, community school, independent school, nursery, pupil referral units, voluntary schools and other types of school;
- School phase: primary, secondary or other, derived from the numbers of pupils aged 4-10 and 13-15;
- The numbers of boys and girls by age (these were restricted to those aged 4-15);
- Numbers of pupils entitled to free school meals;
- Numbers of pupils by ethnic group (White, Black, Asian and Other). This and the data on numbers of free school meals related to all school students of all ages, including pupils over 15, and were used to derive the proportions belonging to the different ethnic groups and entitled to free-school meals;
- Sex denomination of school: boys, girls or mixed; and
- Distances from home to school (as described in Section 2.4).

From the London School Travel Plan database we identified whether each school had a School Travel Plan in 2004/5/6.

Finally, schools were classified according to geographical sectors, based on the five Learning and Skills Council sectors relating to the borough in which the school resides.

There were 3155 schools in the original dataset but some schools had to be excluded from the analysis for various reasons. These included:

- 194 schools for which there was no data at all on pupil numbers;

- 20 for which there were pupil totals by age and sex but not by ethnicity, and for which it was not possible to derive the proportions entitled to free school meals;
- 29 which had no totals by age and sex, although they had a breakdown by ethnicity;
- 11 schools for which the data was obviously miscoded, as the recorded proportion of pupils being entitled to free school meals exceeded 100%;
- 62 schools that had fewer than 15 pupils, and might therefore have non-typical casualty-rates.

After these eliminations, there were 2850 schools (90%) remaining in the dataset. However, there were two further information gaps:

- For 459 schools there was no information on pupils' average distance from school;
- 428 schools had no information on ethnicity (it was coded as 100% not-known).

These schools clearly could not be included in any analysis of the effects of ethnicity and distance from home. However, they could be used in the analyses of other factors potentially affecting casualties. To a large extent, these two groups overlapped, so that whilst our full dataset covered 2850 London schools, the more restricted dataset, excluding schools with unknown ethnicity and distance from home, covered 2390 schools (76% of the full dataset).

6.2 Variations between Types of Schools

To determine the main factors at work from amongst those studied, we calculated each school's casualty rate, comparing the five years of casualties per 1000 pupils (using the 2005 school population), and assessed how this might vary according to their recorded characteristics.

As already noted from Table 6.1, the distribution of casualty rates across London schools is highly skewed, with a high proportion of schools having a zero rate. A suitable tool for analysing casualty rates in these circumstances, and in the presence of a clutch of continuous and categorical variables, is the multivariate analysis technique CHAID[49]. CHAID examines the variation in the 'target variable' and finds the factor or factors that most effectively divide the population (in this case, schools) into contrasting groups (in this case, high vs. low casualty rates). It then proceeds to find any further factors that may 'explain' the differing casualty rates within these groups in a statistically robust manner. The first groups to be identified form the main branches of a 'tree', which can themselves be divided according to factors that effectively define further contrasting groups.

Two main analyses were performed, both with casualties-per-1000-pupils as the target variable:

- using the **full schools dataset**, and considering all of the available 'school characteristics' variables (described above) except for pupils' ethnicity and mean distance from school to home;

---

[49] For this analysis we used a version of CHAID that is available from the SPSS Answertree package. The acronym comes from Chi-Squared Automatic Interaction Detection.

- using the more **restricted schools dataset**, and including all the variables.

Analysis of the Full Dataset

The results of the analysis using the full dataset are shown by the 'tree' in Figure 6.1. At the 'root' of the tree, shown at the top of the diagram, are the statistics for the target variable, showing that the 2850 schools have a mean of 2.28 casualties per 1000 pupils over the five year period.

Below the root are two branches, identifying the most fundamental explanatory factor: this is school level, a factor which, of course, strongly reflects the age factor found in the earlier analysis of casualties per child. The first 'branch' comprises the 550 secondary schools and the second 2300 primary and other (mixed level) schools. The casualty rate for secondary schools (4.5 casualties per 1000 pupils) is significantly higher than that for primary and other schools (1.7), as can be seen from the confidence limits.

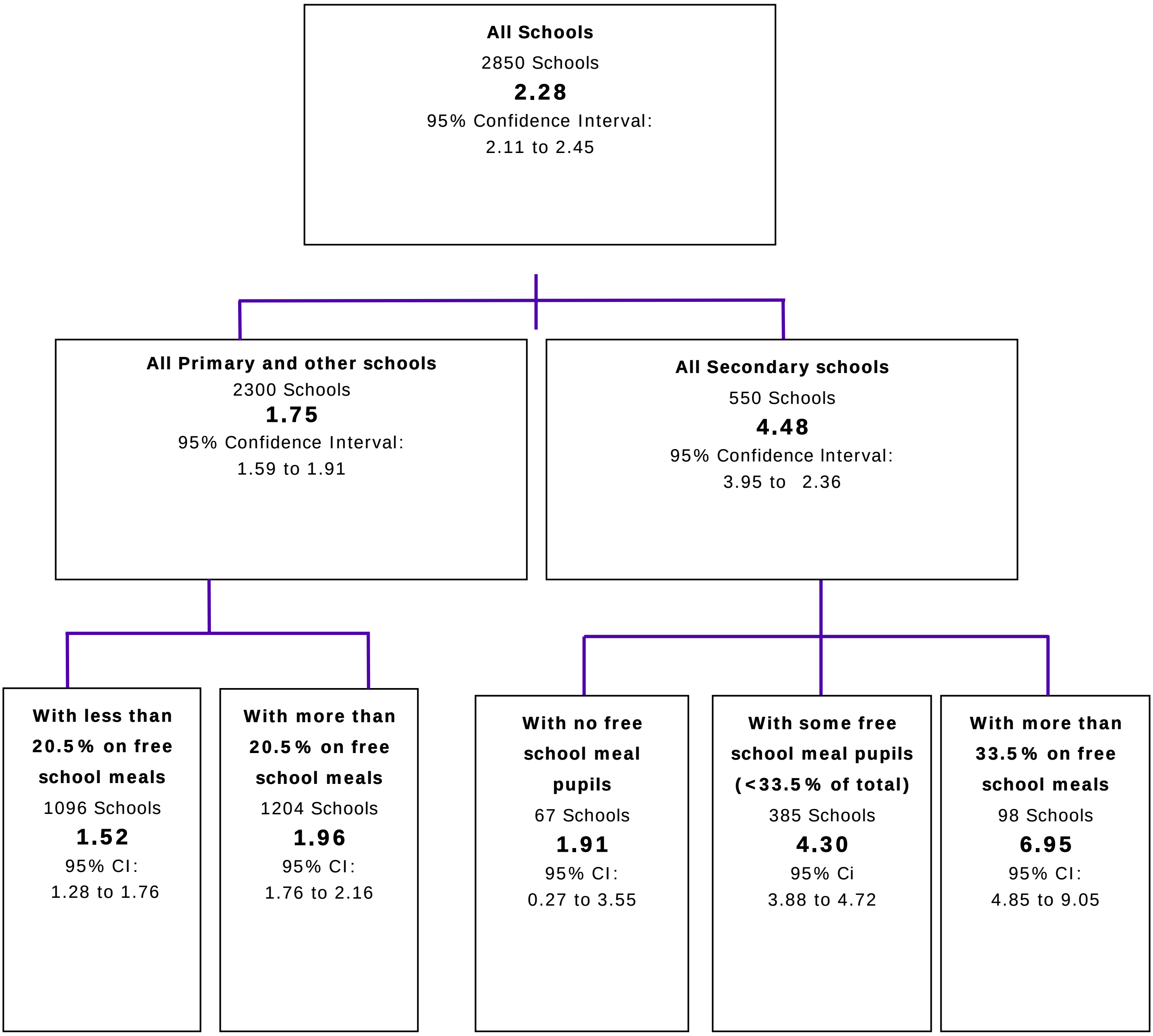
Below the secondary branch, CHAID has identified three groups, defined by the proportion of pupils entitled to free school meals. When this proportion is zero – ie., among all schools where no pupils received free school meals - the casualty rate is relatively low, averaging 1.9 casualties per 1000 pupils. When the proportion is above zero but below 33.5%, then the mean casualty rate is 4.3; and when the proportion of pupils receiving free school meals exceeds 33.5%, then the casualty-rate is as 6.9. CHAID has chosen these groups to identify homogeneous groups of secondary schools that have significantly different casualty rates; this can be seen from the confidence limits displayed in the three boxes.

This analysis therefore convincingly illustrates the powerful association between secondary schoolchildren's safety and the proportion of children at their school receiving free school meals: this indicator, of all those considered in the analysis, is of course strongly linked to social deprivation (and often used as a 'proxy variable' for social deprivation).

The free school meals factor is also significant within the 'primary/other school' branch, where it acts as a key factor influencing variation in the casualty rates across these types of school (which overall are low, compared with rates for secondary schools). In this case, two significantly different groups are identified. Primary schools in which fewer than 20.5% of pupils are entitled to free school meals have a mean casualty rate of 1.5, whilst those which, according to this measure, are more socially deprived have a significantly higher[50] casualty record of 1.96 per 1000 pupils.

[50] Confidence limits are indicated in Figure 6.1. The standard error of the mean casualty rate is given by the standard deviation divided by the square-root of *n,* the number of schools in each identified group, and 95% confidence limits are approximately equivalent to two standard errors. It can be seen from the confidence limits shown that the sub-groups within the primary and secondary school groups have non-overlapping confidence intervals, although there is small overlap between the primary sub-groups and the secondary sub-groups.

Figure 6.1 - Factors Influencing School Casualty Rates: Using the Full Dataset

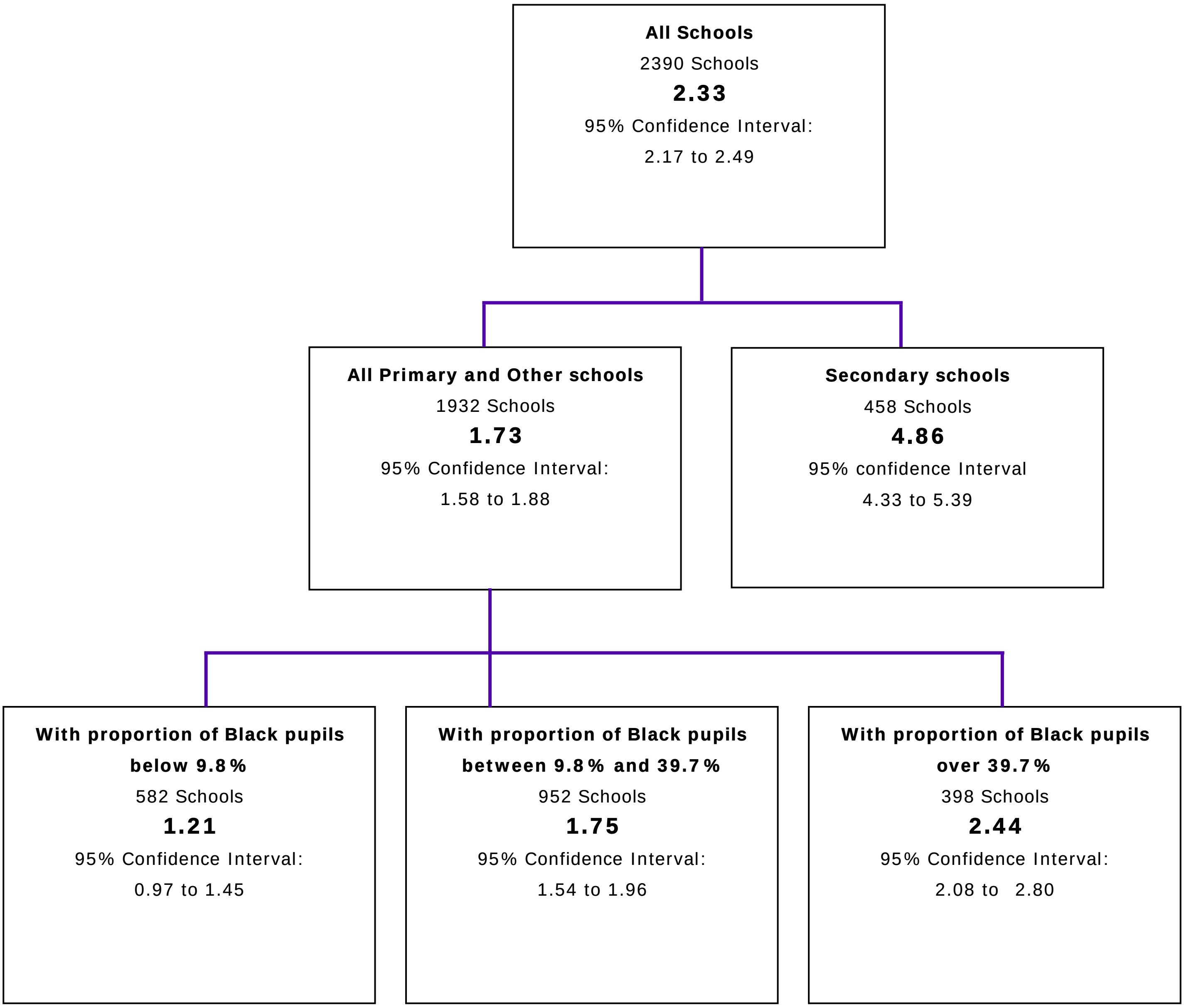


Analysis of the Restricted Dataset

A limitation of analysis using the full dataset is that it could not assess the potential influence on schools' safety of either pupils' mean distance to school or the proportions in the different ethnic groups.

With the restricted dataset we bring these variables into the assessment, as potential explanatory factors, though we are now considering a smaller selection of London schools (2300 or 84% of the full dataset). The results are shown in Figure 6.2.

Figure 6.2 - Factors Influencing School Casualty Rates: Using the Restricted Dataset



It should be noted that the overall mean casualty rate across this slightly smaller total number of schools is slightly higher: it has increased from 2.28 casualties per 1000 pupils, across the full dataset, to 2.33. However this difference does not affect the search for factors that might influence differences in casualty rates of the schools considered.

Again, the first and main explanatory factor identified is the split between secondary schools, with a mean casualty rate of 4.9 per 1000 pupils, and primary/other schools with a mean rate of 1.7. No further factors are identified below the secondary school branch, because the variation amongst 458 schools in this group was insufficient to justify other factors.

However, below the primary/other branch three branches are now identified with significantly different casualty rates. These groups are defined in terms of the proportion of pupils in the Black ethnic group. As the proportion of pupils in the Black group rises, so does the mean casualty rate. When there are fewer than 9.8% in the Black group, the mean casualty rate is 1.2 when the proportion is between 9.8% and 39.7%, the mean casualty rate is 1.8, and the mean rate is 2.4 when the proportion in the Black group rises above 39.7%.

The availability of the ethnicity variable in the restricted dataset has now allowed us to identify three sub-groups of primary schools with distinct casualty rates. However, with fewer schools in the restricted dataset, it has not been possible to sub-divide the secondary schools into distinct groups in the same way as before.

6.3 Influence of Characteristics of the School

To a large extent the CHAID analysis is consistent with, and reinforces, the findings in Section 5 from borough-based comparisons of casualty rates among different groups of children and the factors that influence them. The fundamentally important influence of pupils' age emerging from that previous analysis is echoed by the contrasting casualty rates of primary and secondary schools.

Of the school characteristics assessed, the factor that most influences the (overall higher) casualty rate across secondary schools is the proportion of pupils receiving free school meals. Considering safety in London's primary and other types of schools, the two factors most strongly associated with higher casualty rates are the proportion of pupils receiving free school meals and the proportion of Black pupils.

These factors each appear to have distinct influence on casualty rates, but they also overlap to a certain degree. This finding is consistent with other recent research for LRSU[51] which found that measures of both deprivation and ethnicity (and in particular the proportion of Black pupils) were significantly related to casualty rates, but that there is also good evidence for a relationship between deprivation and child pedestrian injury after adjusting for effects of ethnicity. It has not been possible, however, to say definitively which of the two factors, the proportion entitled to free school meals and the proportion of Black pupils, is most influential, because the ethnicity data are not available for over 400 schools.

One factor that has not emerged as a strong predictor of schools' casualty rates, against expectation, is the sex of the school: the analysis has not detected any strong contrast between all-boys, all-girls and mixed schools. The generally higher casualty rates among boys were a striking feature of the borough-level analysis and it is possible that a school-sex effect would have emerged if the CHAID trees had been extended beyond the limits specified. However it seems that the relatively coarse nature of this variable, with just three categories (of all-boy, girls and mixed schools) means it has a statistically weaker influence on recorded casualty rates across schools as a whole than the other factors identified above.

The criteria that have been emerged clearly as important determinants of casualty rates - the proportion of pupils entitled to free school meals, and the proportion of Black pupils in each school – could help to prioritise the implementation of travel plans across London schools**.**

---

[51] Edwards, Roberts, Grundy, Lachowycz and Green (2006) Deprivation and Road Safety in London: Relationships and Risks, Report to LRSU

7 Does Safety Vary By Area?

7.1 Method

Approach

Previous studies have noted links between deprivation and casualties, which have been attributed to living in close proximity to busy roads, travelling mainly on foot in poor quality pedestrian environments, and a lack of adult supervision[52]. We have also found that casualties are associated with certain road environments where there is high exposure to risk, including in particular single-carriageway roads, 30 mph and higher speed limits, and where there is a lack of dedicated facilities where pedestrians cross the road (Chapter 4).

We hypothesised that casualties would vary across London under the influence of these and other factors, including the child population, its demographic composition and the number of schools in the local area. The analysis has therefore investigated casualty rates by borough, and how these vary according to the mode used, sex, age and ethnicity of child casualties.

Data Sources

To investigate differences at the borough level, we have derived casualty rates by comparing casualties in the five years between 2001-2005 and the average annual school-aged borough population during this time (as described in Chapter 5). We know from the ACCSTATS analysis that there have been few collisions within 20mph zones. This chapter also considers the location and size of these zones, their spatial relationship to schools and pupils, and the case for increasing their coverage.

7.2 Variations Between Boroughs

There are wide variations in casualty rates[53] between the boroughs. These are demonstrated by the ranges in Tables 7.1 to 7.4, and shown in full in the data tables in Appendix B. The confidence limits for individual boroughs are much wider than the pan-London limits given in Chapter 5, because the borough rates are based on fewer data. It must also be borne in mind that we had to impute the home borough in about 50% of cases and this may have generated some inaccuracies. They will also vary because the mode of travel, and the distance travelled, will differ from borough to borough; for school journeys the proportions travelling on foot or by car are of course particularly important.

---

[52] Abdalla, I.M., Raeside, R., Barker, D., and McGuigan, D.R.D., (1997a) An investigation into the relationships between area social characteristics and road accident casualties. Accident Analysis and Prevention, 29, 5, 583-593. Abdalla, I.M., Barker, D., and Raeside, R., (1997b) Road accident characteristics and socio-economic deprivation. Traffic Engineering and Control, 38, 672-676. Abdalla, I.M., (1997) Statistical investigation and modelling of the relationships between road accidents and social characteristics. PhD. Thesis, Napier University. Also and Graham D, Glaister, S and R Anderson (2002). Child Pedestrian Casualties in England: The effect of Area Deprivation. Centre for Transport Studies. London, and Erskine, A., (1996) The Burden of Risk: Who Dies Because of Cars? Social Policy and Administration, 30, 2, 143-157

[53] The casualty rates reported here are based on the numbers of casualties in 2001–2005 divided by the average annual child population.

The widest range in the casualty rate by mode is for pedestrians. Mean rates range from 0.73 casualties per 1,000 children living in Richmond to 3.94 in Lambeth for school journeys, and 0.99 in Richmond and 4.67 in Southwark for other journeys. Considering the casualty rates for age[54] and sex, the highest rate is for 11-12 year old boys in Kensington & Chelsea and Lewisham (11.8 casualties per 1000 children between 2001-2005).

The rates by ethnicity are particularly varied. Black children in Hackney and Merton appear to be especially at risk, but it should be borne in mind that the ethnic classifications and therefore comparisons of rates are susceptible to police reporting practices, including differences in whether reporting officers used the 'Other' category when they were unsure of the casualties' ethnic groups.

The rate ratios between school and non school once again confirm that school journeys are much safer than other journeys for all children.

Table 7.1 – Ranges in Borough Casualty Rates by Mode (2001-2005)

	School Journeys			Other Journeys			Rate ratio (school/ other)
	Min	**Mean (all boroughs)**	Max	Min	**Mean (all boroughs)**	Max	
Pedestrians	0.73	**2.34**	3.94	0.99	**3.04**	4.67	0.77
Cyclists	0.0	**0.16**	0.71	0.35	**1.08**	2.21	0.15
Car passengers	0.09	**0.45**	0.96	0.92	**2.40**	3.88.	0.19
Bus passengers	0.0	**0.15**	0.45	0.03	**0.23**	0.66	0.65
Other	0.0	**0.04**	0.18	0.0	**0.34**	1.07	0.12

Note: Figures shown are five-year casualty rates per 1000 child population, and the mean is the mean rate across all London boroughs

[54] The casualty rates are based on the numbers of casualties in 2001–2005 divided by the average annual child population in each age group.

Table 7.2 – Ranges in Borough Casualty Rates by Age (2001-2005)

	School Journeys			Other Journeys			Rate ratio (school/ other)
	Min	**Mean all boroughs**	Max	Min	**Mean (all boroughs)**	Max	
4-10	0.77	**1.80**	3.05	1.64	**5.81**	8.47	0.31
11-12	2.58	**6.32**	10.63	2.15	**8.34**	13.18	0.75
13-15	1.72	**4.19**	10.63	5.15	**9.50**	12.63	0.44

Note: Figures shown are five-year casualty rates per 1000 child population, and the mean is the mean rate across all London boroughs

Table 7.3 – Ranges in Borough Casualty Rates by Sex (2001-2005)

	School Journeys			Other Journeys			Rate ratio (school/ other)
	Min	**Mean (all boroughs)**	Max	Min	**Mean (all boroughs)**	Max	
Boys	1.85	**3.52**	5.41	3.57	**8.45**	11.36	0.42
Girls	0.9	**2.73**	5.3	2.19	**5.63**	7.74	0.48

Note: Figures shown are five-year casualty rates per 1000 child population, and the mean is the mean rate across all London boroughs

Table 7.4 – Ranges in Borough Casualty Rates by Ethnicity (2001-2005)

	School Journeys			Other Journeys			Rate ratio (school/ other)
	Min	**Mean (all boroughs)**	Max	Min	**Mean (all boroughs)**	Max	
White	0.96	**2.34**	4.7	2.04	**5.49**	10.8	0.42
Black	0.0	**4.93**	7.32	3.68	**10.24**	17.21	0.48
Asian	0.0	**1.74**	3.3	0.63	**4.35**	35.97	0.40

Note: Figures shown are five-year casualty rates per 1000 child population, and the mean is the mean rate across all London boroughs

7.3 20 mph Zones: The Picture in London

Previous studies[55] have shown that 20mph zones have been effective in reducing the number of collisions and the severity of casualties. There has been a programme to implement 20mph zones on local roads that have a higher than average frequency of collisions and by 2006 TfL identified in a preliminary inventory that there were 360 such zones across London, covering 1785kms of local roads (Figure 7.1).

Many of the zones have been located in the vicinity of schools to improve the safety of schoolchildren. Of the 2977[56] schools which we were able to include in this analysis nearly 500 schools (17%) (with 160,000 pupils) are now within 20mph zones (Table 7.5). A further 185 schools are within 100m of a zone and so more pupils may benefit from safer conditions at least along part of their route (Figure 7.2).

The zones tend to be small, and so while the mean area is 0.29km^2, the median is just 0.19km^2. Assuming that the zones are circular, for illustrative purposes, the mean radius is just 300m, whereas the mean distance travelled to school is 1.8km (Section 2.4), so that it is likely that many journeys will pass through or across one or more zones.

Table 7.5 – Number and Proportion of Schools Within 20mph Zones

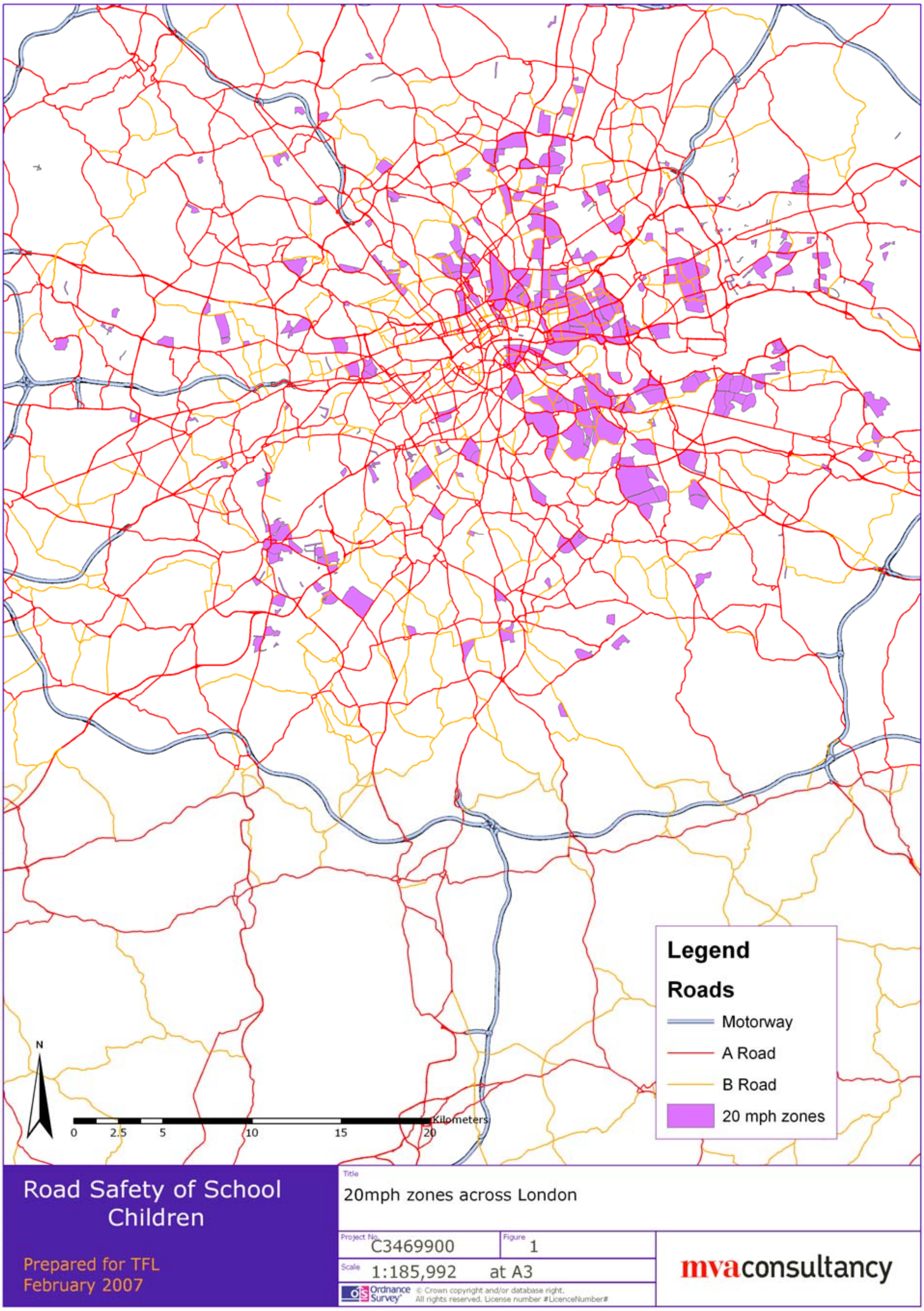
Type	Number of Schools	Number of Schools within 20mph Zones
All Schools	2977	497 (17%)
Primary	1809	350 (19%)
Secondary	401	56 (14%)
Unknown *	658	91 (14%)

* type of school not recorded in the DfES School Census dataset

[55] Webster, Dc and Mackie, AM (1996). Review of traffic calming schemes in 20mph zones. TRL Report 215, and Webster, DC and Layfield, ED (2003) Review of 20mph zones in London Boroughs. Unpublished TRL report for TfL.

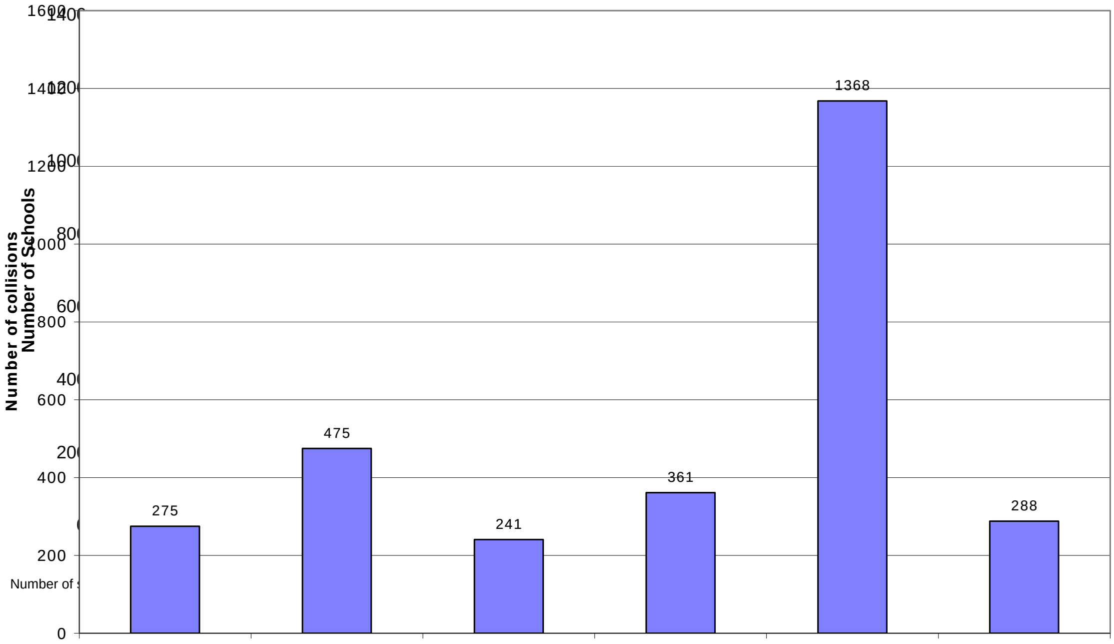
[56] 2977 schools were included in this analysis compared with 2850 in Chapter 6. Fewer schools had to be excluded as the analysis was not dependent on the pupil profile of the school.

Figure 7.1 – 20mph Zones Across London (2006)



mvaconsultancy

Figure 7.2 – Distance Between School and Nearest 20mph Zone (2006)



It was previously noted that there have been very few collisions recorded in 20mph zones between 2001-2005 (Table 4.7). The rate of implementation of zones has speeded up in recent years and our spatial analysis using the ACCSTATS extracts for 2001-2005 (used for the trend analysis in Chapter 3) shows that 9% of collisions on school journeys occurred in areas that are now in 20mph zones (Figure 7.3). Arguably, many of these would not have occurred if there had been a 20mph zone in place at the time. Over half (55%) occur more than 500m from a 20 mph zone. However 16% occur within 100m of a 20 mph zone and hence extending the coverage of the 20mph zones could have prevented these collisions.

Figure 7.3 – Distance Between Collision and Nearest 20mph Zone implemented by 2006 (2001-2005)

8 Summary of Key Findings

8.1 Safety of Children in London: Travel Patterns and Trends

There have been considerable changes in school travel since 1994-98, the baseline period for the Mayor's casualty reduction targets. These have major potential implications for children's safety. The average distance has increased and the proportion of children travelling alone has fallen, as more pupils, particularly younger children, switch from walking to car use.

In London, about 48% of children currently walk to or from school, but this proportion has been falling as both primary and secondary school age pupils have switched to using the bus or travelling by car. Numerous studies have demonstrated that car dependency has detrimental impacts of children's health, fitness levels and their overall development, and also increases traffic which in turn increases the risk of pedestrian and cyclist injury. The average distance to primary school has been rising in line with the national trend and is now 1.6km, while the average distance to secondary school has stopped rising and instead fallen slightly to 3.1km.

Modal shares for walking and travelling by car to schools in London have generally been following the national trends. However, bus use is rising in London, whereas nationally it has remained steady. The resulting picture for primary schoolchildren is comparable with the national average, but secondary schoolchildren differ, with fewer walking and more travelling by public transport, and with the introduction of free travel on some public transport modes.

These changing travel patterns have mixed implications for road safety. While the risk of being involved in a collision increases with the distance travelled, the switch to car (and bus, in London) is reducing exposure to injury for those who now travel by motorised modes. While younger children generally seldom choose how to travel, those who continue to walk are more at risk, and they therefore need more protection.

8.2 How Safe Are London Schoolchildren?

After removing records that were apparently miscoded, or which could not be verified as relating to collisions involving school aged casualties making journeys for identified school or other purposes, the resulting edited ACCSTATS dataset for 1994-2005 contained 33,350 school aged casualties. Of these, 8,814 were involved in collisions on the school journey and 24,716 were making other journeys. While this edited dataset clearly under-represents the total casualties in London, it has enabled reasonably robust estimates to be made of injuries occurring on school and other journeys.

In 2005, 538 children were injured on school journeys and 1,192 were injured on other journeys. As 61% of all children's journeys[57] are to or from school, this suggests that the school travel is comparatively safe. In addition, the injuries sustained on school journeys are less severe than those that occur on other journeys.

[57] In this report a journey is equivalent to a 'trip' in LATS, and can comprise any number of stages. Walk is only counted when it forms a complete journey, not when it forms part of a longer journey.

This might suggest that an increased emphasis is called for in policies and initiatives aimed at improving children's safety on their other journeys, rather than school journeys, which account for a substantial proportion of TfL and Borough spending on local road safety. However, there are many factors that influence the differences in safety that need to be taken into account. The main driver is mode used, and there are significant differences in the number of casualties by mode on school and other journeys. In particular, school travel involves greater use of public transport than other journeys, and this is a very safe mode.

Most school journeys are also made on foot. Whilst pedestrians are at greater risk of injury, local education authorities are required to assess the walking route to each child's nearest appropriate school, and continued investment in Safer Routes to School and other initiatives have improved the safety of the pedestrian environment. Children also have usually greater familiarity with regular journeys to school. Hence we should expect school journeys to be safer than other journeys made on foot.

Mode Used

The majority of children injured on the school journey were pedestrians at the time of the collision. Considerably fewer and less severe injuries occur to children using other modes, reflecting the reliance on walking (for end to end journeys and stages of multi-modal trips), and the comparative safety of motorised modes.

Very few children currently cycle to or from school (typically only 1%) and yet they account for 4% of all casualties and a disproportionately large number of KSIs. Further analysis shows that these casualties are all boys. This reflects the greater incidence of cycling amongst boys and, possibly, different attitudes towards road safety and appropriate behaviour whilst travelling.

In view of this finding and the potential health and environmental benefits that would flow from increased cycle use, more effective ways should be found of improving the safety of cyclists in London.

Age Group

The distribution of casualties on school journeys varies with age, with a peak in casualties at 11-12 years. This is the age at which children move up to secondary school, typically travel further and often start using a different mode. While road safety education targeted at younger children may help with the acquisition of key safety skills, increased policy attention to young adolescents making the transition to secondary school may therefore be desirable.

Sex

The demographic groups with the largest proportion of casualties on school journeys are 11-12 year old boys and 13-15 year old girls. Girls travel more by car than boys, and this increase in the likelihood of being injured with age may result from girls in their mid-teens travelling with young drivers. This again emphasises a need for continuing efforts to reduce young drivers' driving behaviour and risks of collision involvement.

Ethnicity

Using the police definitions, White children make up the largest proportion of all casualties on school and other journeys. However there is a significant over-representation of Black children, compared to the ethnic profile of London. This clearly suggests the need for specifically targeted and tailored safety interventions.

8.3 Has Safety Improved Over Time?

There has been a clear downward trend in child casualties since the 1994-98 baseline period. By 2005, all casualties have fallen by 46% compared to this baseline, and KSIs have dropped by 60% - already meeting the 2010 target. This trend has occurred in the context of significant improvements in road safety in London through the 1990s, including on-going investment in road safety education and training, the implementation of accident remedial measures and 20mph zones around schools.

Mirroring this overall trend in declining casualties, there have been falls in the number of injuries occurring on school and on other journeys. However, the fall in casualties on school journeys has been much less pronounced than the change in other journeys, but the rate of reduction has not yet tapered off, so there is still the potential for reducing casualties on school journeys further. This might be achieved by encouraging further modal shift to safe public transport modes, and through increased protection for children continuing to walk.

There is some variation between the age groups and sexes. All casualties on other journeys have fallen most amongst the youngest children (-55%, compared to -48% for 11-12s and -45% for 13-15s). The greatest change on school journeys has been amongst the 11-12 year olds (-27%, compared to -24% for 4-10s and -20% for 13-15s), and boys (-32% compared to -26% for girls), resulting from greater proportional reductions in both KSIs and slight injuries.

Combining age and sex data, we can see that it is the youngest girls and boys that have experienced the greatest improvement in road safety on school journeys (Table 3.2). There has been little improvement with the oldest girls (-9%); this is to be expected because they tend to travel more by car and the overall numbers of car passenger injuries have risen.

The main beneficiaries of the improvements in road safety are pedestrians. Pedestrian casualties have fallen by 28% compared to the 1994-98 baseline, and pedestrian KSIs have dropped by 56%. However, the proportion of children walking to school has also been declining with the switch to car, and to a lesser extent, bus and other modes. So some of the casualty savings will have come from the fall in children's exposure to risk.

There has also been a fall in cyclist casualties. Whilst this is small, it is statistically significant, as more children are now cycling, and this is being encouraged in School Travel Plans. In contrast, casualties involving car passengers have fluctuated and increased slightly overall (by 9%) and casualties amongst bus users have remained steady, but at a low base.

Casualties amongst Black children have been rising (by 10%), in stark contrast to the declines in other ethnic groups. This is due to the growth in injuries to Afro-Caribbean children. The trend is not explained by changes in the 4-15 years Black population in London (the population of Black children aged 4-15, measured as a proportion of all children aged 4-

15 in London, rose by about 1.5% between 2000 and 2005, from 18.9% to 20.5%, and the Black population aged 4-15 actually declined by 3%). Instead, it may be linked to greater use of walking and higher deprivation in the Black community.

8.4 What Circumstances Contribute to Collisions?

When are collisions more likely to occur?

We have identified that collisions on school journeys are concentrated into two peaks: one in November, and the second between March and June. They tend to occur in daylight and in fine weather, and are slightly more likely on the journey home from school (46%, between 1500 and 1659 hours) than the journey to school (36%, between 0700 and 0859).

What road conditions are associated with collisions?

We found that the combination of wet road surfaces and otherwise dry weather (ie., periods following rainfall when visibility is back to normal) accounts for a significant proportion of collisions. Possibly, drivers fail to allow for longer braking distances on roads that remain wet after weather conditions appear to have become normal. This issue could be addressed in driver education, training and testing programmes.

What features of the road environment are linked with high numbers of collisions?

There are strong relationships between numbers of collisions and certain features of the road environment. These vary for collisions involving London children as pedestrians, cyclists and car passengers.

The vast majority of collisions involving **pedestrians** are on roads with 30mph speed limits. None were recorded in 20 mph zones, supporting the case for their continued implementation. Most involved children crossing the road away from a crossing facility. There may be a case for further interventions to encourage more use of existing crossing facilities, and reviewing the criteria for implementing pedestrian crossings, with a view to introducing more and improving their location in relation to pedestrian desire lines.

Collisions involving **car passenger** casualties are much more likely to take place on roads with 40 or 50 mph limits than collisions with pedestrians or cyclists. Of the 2824 collisions causing injuries to children car passengers in 1994-2005, just over 15% occurred on school journeys, while almost five times as many (a total of 2,396 in the ACCSTATS dataset) occurred while children were making other types of journey in cars. This is surprising since LATS data show there is an approximate 50:50 split between journeys to/from school and other journeys made by children aged 5-16 as car passengers. This apparent difference in risk may be partly explained by the fact that 'other' journeys tend to be longer, and more often made on roads with higher speed limits that are less familiar to the drivers.

Collisions with **cyclists** seldom occur where there are crossing facilities. They are more likely to occur near junctions, particularly priority junctions. This clearly supports the case for continued investment in dedicated cyclist facilities.

Which vehicle manoeuvres are involved?

Over two thirds of the vehicles involved in collisions with all types of road users are at a junction, or near to a junction, when the collision occurred. However, those that collided with other cars (causing car passenger casualties), or with cyclists, were much more likely to be mid-junction at the point of collision, while those that collided with pedestrians were more usually either approaching a junction or clearing one. The fact that pedestrians appear particularly at risk when drivers are nearing or leaving junctions suggests that drivers' attention could be a factor (their attention may be directed at the road layout, other vehicles, and on planning the manoeuvre beforehand, and their attention may relax after the junction is cleared). Another factor could be the position and behaviour of child casualties near to the junction: however ACCSTATS does not record this information in any detail.

The analysis also shows that cyclists have a particular vulnerability to collisions that occur when cars are entering a main road. It is likely that limited visibility of cyclists, driver sightlines and blind spots are the main problems here. These could be picked up in driver training and information campaigns, along similar lines to 'motorcycle awareness' initiatives.

Manoeuvres that are particularly risky for car passengers include slowing or stopping, and turning or waiting to turn, especially for right turns. These account for about one fifth of all collisions that caused injuries to child passengers in cars (and nearly a quarter on journeys to/from school). They also account for one in ten of all collisions with cyclists and 6% percent of collisions with pedestrians.

What types of driver are involved?

It is important in planning collision prevention strategy, and the possible role for driver education, to understand how the behaviour of drivers involved in collisions contributed to these collisions. Although ACCSTATS has only limited information on the behaviour of drivers and vehicles involved in collisions, it does allow us to identify their characteristics, to help guide the targeting of possible driver information campaigns.

The analysis investigated the profiles of drivers involved in collisions was constrained by missing information, but we were able to identify several key findings. On school journeys, the drivers in the car with the child that is injured are mostly females, aged 25-44. Those carrying children on non-school journeys are more likely to be males, but in the same age group.

Drivers involved in collisions with vulnerable road users (pedestrians and cyclists) tend to be local residents; half of them are involved in collisions within 3kms of home, and two-thirds are within 5kms.

Which drivers are responsible for collisions?

ACCSTATS data on collisions involving more than one driver include records of police officers' subjective judgements of which driver, if any, they considered to be responsible (because for example they were thought to be driving too fast, undertaking an unsafe manoeuvre, or influenced by drink or drugs).

In the 92% of collisions on school journeys involving more than one driver, drivers of the 'other vehicle' were more likely to be considered responsible than were the drivers escorting the injured child. In the other 8% of collisions that involved only one driver, this driver's actions were classified as the main contributory factor in 50% of the cases. Collisions involving no other vehicle were more likely to have been influenced by bad weather or dangerous road conditions.

Drivers considered responsible for collisions tend to be younger, irrespective of which vehicle they were driving. However, younger drivers aged under 25 were more likely to be the driver considered responsible for the collision when they were the 'other driver', rather than the driver carrying the child.

The drivers involved in collisions with pedestrians and cyclists tend to be local residents. Half of them are involved in collisions within 3kms of home, and two-thirds have collisions within 5kms of home. There is little difference in the distances from home of collisions on school and other journeys.

According to police reports, which main factors contributed to collisions?

ACCSTATS collision records include a police-identified 'contributory factor'. These refer to circumstances of the collision, and reported behaviour by the parties involved (drivers and child casualties) that were thought by police to have contributed to the collision. This information should be treated with great caution[58], as the factors reported reflect the reporting officers' opinion at the time of the accident and may not be based on extensive investigation.

For child pedestrian casualties, the 'top three' police-reported factors all relate to actions attributed to the child involved. For school journeys, they are 'crossing the road heedless of traffic elsewhere' (47%), 'crossing the road masked by parked vehicles' (22%) and 'crossing the road heedless of traffic and pedestrian crossing' (8%). The most important driver factors are 'failure to give precedence at a zebra/pelican crossing' and 'going too fast with regard to the road environment', which together reportedly account for 8% of all collisions involving pedestrians. The pattern for non-school journeys is very similar.

The top three factors for collisions involving children as car passengers were 'going too fast having regard to the road environment' (20% of collisions); 'disobeyed traffic signal/road markings' (19%) and 'driving too close to a nearby vehicle' (12%). These are clearly, for the most part, driver factors, and this is again the case for collisions that occurred on the non-school journeys. The factors for the other journeys are slightly different with 14% for 'disobeyed traffic signal/road markings' and 8% 'driving too close to a nearby vehicle'.

The most frequently reported 'contributory factor' for collisions involving cyclists, for both journeys to/from school and other journeys is 'riding on the pavement/off pavement/across a pedestrian crossing' (29% and 34% of collisions respectively).

---

[58] Particular caution is required in interpreting the findings on contributory factors, especially in respect of collisions involving child pedestrian casualties. The fact that only one factor could be reported pre-January 2005 may tend to introduce a bias, concerning which actions by which the parties involved– the driver, or the child – contributed more to the collision. The post-January 2005 classification system allows officers to identify and record actions by more than one of the parties involved that contributed to the collision. For further comment on the limitations of pre and post-January 2005 reporting systems, see Section 4.6.

8.5 Which Groups are Most at Risk?

Children on school journeys are significantly safer than those on other journeys. The casualty rate per 1000 population is lower for each modal group, with the exception of bus users who have particularly low casualty rates on school and other journeys.

Child pedestrians are a fifth less likely to be injured on school journeys than other journeys. This probably reflects the role of LEAs and parents in assessing the routes used to and from school, the investment in remedial measures to improve the pedestrian environment in the vicinity of schools, and other factors such as the short distances. The same is likely to be true of cycle journeys.

The casualty rate ratio for children who travel by car is remarkable in that school journeys are five times safer than other journeys. This possibly reflects shorter distances, parents' familiarity with the route, established routines and peak period traffic congestion slowing vehicular speeds.

Pedestrians comprise the largest modal group within the ACCSTATS casualty dataset (75% of casualties on school journeys and 42% on other journeys) and so we anticipated that they would have the highest casualty rate per member of the child population. The analysis confirms that this is true for both school and other journeys, and the rates are significantly higher than those for the other modes used at the 95% confidence level. Boy pedestrians are most at risk.

Although pedestrians have the highest casualty rate, this does not mean that walking is the most dangerous way of travelling. Walking is used for more journeys than any other mode. If we consider the casualty rate per 1000 trips using trip rates from the LATS 2001 Household Surveys, we can see that the differential between walking and motorised modes falls.

Against the baseline of casualty rates for trips made by bus, which is one of the safest modes, walking is 4.7 times more dangerous. Walking is also three-times more dangerous than travelling by car on school journeys. However these casualty rate ratios would be reduced (walking would appear relatively safer) if the longer distances covered on car and bus journeys were taken into account. The same would apply if were able to include walk stages of multi-modal journeys in the analysis - and this would provide a more complete picture of the amount of walking that is actually done.

Of all the main modes, comparing casualty rates per 1000 trips, cycling emerges as the most risky, with a casualty rate 27.6 times higher than the bus and nearly six times higher than walking. This finding must be seen as a key concern, and one that reinforces the importance of cycle training, driver awareness campaigns and other interventions including cycle routes to protect these vulnerable road users.

Comparing risk of injury according to demographic factors, boys' casualty rates are significantly higher than the girls' in each age group. On school journeys, the highest rate is for 11-12 year old boys which is 3.5 times higher than 4-10 year old boys. Black children are least safe; they are at significantly higher risk of injury than those from other ethnic groups on both school and other journeys.

These findings have clear implications for the targeting of road safety education and casualty reduction measures, in terms of types of child and methods of travel.

8.6 Does Safety Vary by Area?

There are wide variations in casualty rates between the boroughs. The widest range in the casualty rate by mode is for pedestrians. The mean per 1,000 child population ranges from 0.73 in Richmond to 3.94 in Lambeth for school journeys, and 0.99 in Richmond and 4.67 in Southwark for other journeys.

Considering the casualty rates for age and sex, the highest rate is for 11-12 year old boys in Kensington & Chelsea and Lewisham (11.8 casualties per 1000 children between 2001-2005)

The rates by ethnicity are particularly varied. Black children in Hackney and Merton appear to be especially at risk, but it should be borne in mind that the ethnic classifications and therefore comparisons of rates are susceptible to police reporting practices.

Previous studies have shown that 20mph zones have been effective in reducing the number of collisions and the severity of casualties. In London, there has been a programme to implement 20mph zones on local roads and by 2006 (according to a preliminary inventory) there were 360 such zones across London covering 1785kms of local roads. Many of these have been located in the vicinity of schools to improve the safety of schoolchildren. ACCSTATS analysis shows that there were very few collisions recorded for both school and other journeys in 20mph zones between 2001-2005. Furthermore, the rate of implementation of zones has speeded up in recent years and 10% of collisions occurred in areas that are now in 20mph zones. Arguably, many of these would not have occurred if there had been a 20mph zone in place at the time. In 2007 TRL carried out a review of 20 mph zones for the London Accident Analysis Unit (LAAU). The results of this study suggest that 20mph zones can lead to large accident and casualty savings[59]

8.7 Does Safety Vary Between Schools?

The casualty rate for secondary schools (4.5 casualties per 1000 pupils) is significantly higher than that for primary schools (1.7), and our analysis found that a factor strongly associated with a secondary school's safety is the proportion of children receiving free school meals. This indicator, of all those considered in the analysis, is of course strongly linked to social deprivation.

Further analysis identified the proportion of pupils in the Black ethnic group as being a key factor in explaining differences in the casualty rates across primary schools, and more influential than free school meals. These two factors each appear to have distinct influence on casualty rates, but they also overlap to a certain degree. This finding is consistent with other recent research for LRSU which found that measures of both deprivation and ethnicity (and in particular the proportion of Black pupils) were significantly related to casualty rates,

[59] Webster D C, Layfield R 2007. Review of 20 mph zones in London Boroughs Project Report 243.

but that there is also good evidence for a relationship between deprivation and child pedestrian injury after adjusting for effects of ethnicity[60]

The generally higher casualty rates among boys were a striking feature of the borough-level analysis. But the sex of the school (all-boys, all-girls or mixed) did not emerge as a strong predictor of schools' casualty rates. However it seems that the relatively coarse nature of this variable, with just three categories, means it has a statistically weaker influence on recorded casualty rates across schools as a whole than the other factors identified above.

The criteria identified as important influencers of school casualty rates - the proportion of pupils entitled to free school meals, and the proportion of Black pupils in each school – could be used to guide the prioritising of travel plan implementations across London schools.

[60] Steinbach et al (2007): Road Safety of London's Black and Asian Minority Ethnic Groups.

MVA Consultancy provides advice on transport and other policy areas, to central, regional and local government, agencies, developers, operators and financiers. A diverse group of results-oriented people, we are part of a 350-strong team worldwide. Through client business planning, customer research and strategy development we create solutions that work for real people in the real world. For more information visit www.mvaconsultancy.com

Birmingham
Second Floor, 37a Waterloo Street
Birmingham B2 5TJ United Kingdom
T: +44 (0)121 233 7680 F: +44 (0)121 233 7681

Dubai
PO Box 123166 Dubai, 803 - 805 Arbift Tower
Baniyas Road, Deira, Dubai UAE
T: +971 (0)4 223 0144 F: +971 (0)4 223 1088

Dublin
First Floor, 12/13 Exchange Place
Custom House Docks, IFSC, Dublin 1, Ireland
T: +353 (0)1 542 6000 F: +353 (0)1 542 6001

Edinburgh
Stewart House, Thistle Street, North West Lane
Edinburgh EH2 1BY United Kingdom
T: +44 (0)131 220 6966 F: +44 (0)131 220 6087

Glasgow
Seventh Floor, 78 St Vincent Street
Glasgow G2 5UB United Kingdom
T: +44 (0)141 225 4400 F: +44 (0)141 225 4401

London
Second Floor, 17 Hanover Square
London W1S 1HU United Kingdom
T: +44 (0)20 7529 6500 F: +44 (0)20 7529 6556

Lyon
11, rue de la République, 69001 Lyon, France
T: +33 (0)4 72 10 29 29 F: +33 (0)4 72 10 29 28

Manchester
25th Floor, City Tower, Piccadilly Plaza
Manchester M1 4BT United Kingdom
T: +44 (0)161 236 0282 F: +44 (0)161 236 0095

Marseille
76, rue de la République, 13002 Marseille, France
T: +33 (0)4 91 37 35 15 F: +33 (0)4 91 91 90 14

Paris
12-14, rue Jules César, 75012 Paris, France
T: +33 (0)1 53 17 36 00 F: +33 (0)1 53 17 36 01

Woking
First Floor, Dukes Court, Duke Street
Woking, Surrey GU21 5BH United Kingdom
T: +44 (0)1483 728051 F: +44 (0)1483 755207

Email: info@mvaconsultancy.com

Offices also in
Bangkok, Beijing, Hong Kong, Shenzhen and Singapore

mvaconsultancy