Department for Transport

Child Pedestrian Exposure and Accidents – Further Analyses of Data from a European Comparative Study

Road Safety Research Report No. 56

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Phil Bly, Kate Jones and Nicola Christie
MVA Limited

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Executive summary

Although Great Britain's overall road safety record is very good in comparison with other countries, throughout the 1990s the accident rate for child pedestrians was higher than average for the European Union (EU) countries (Figure 1).

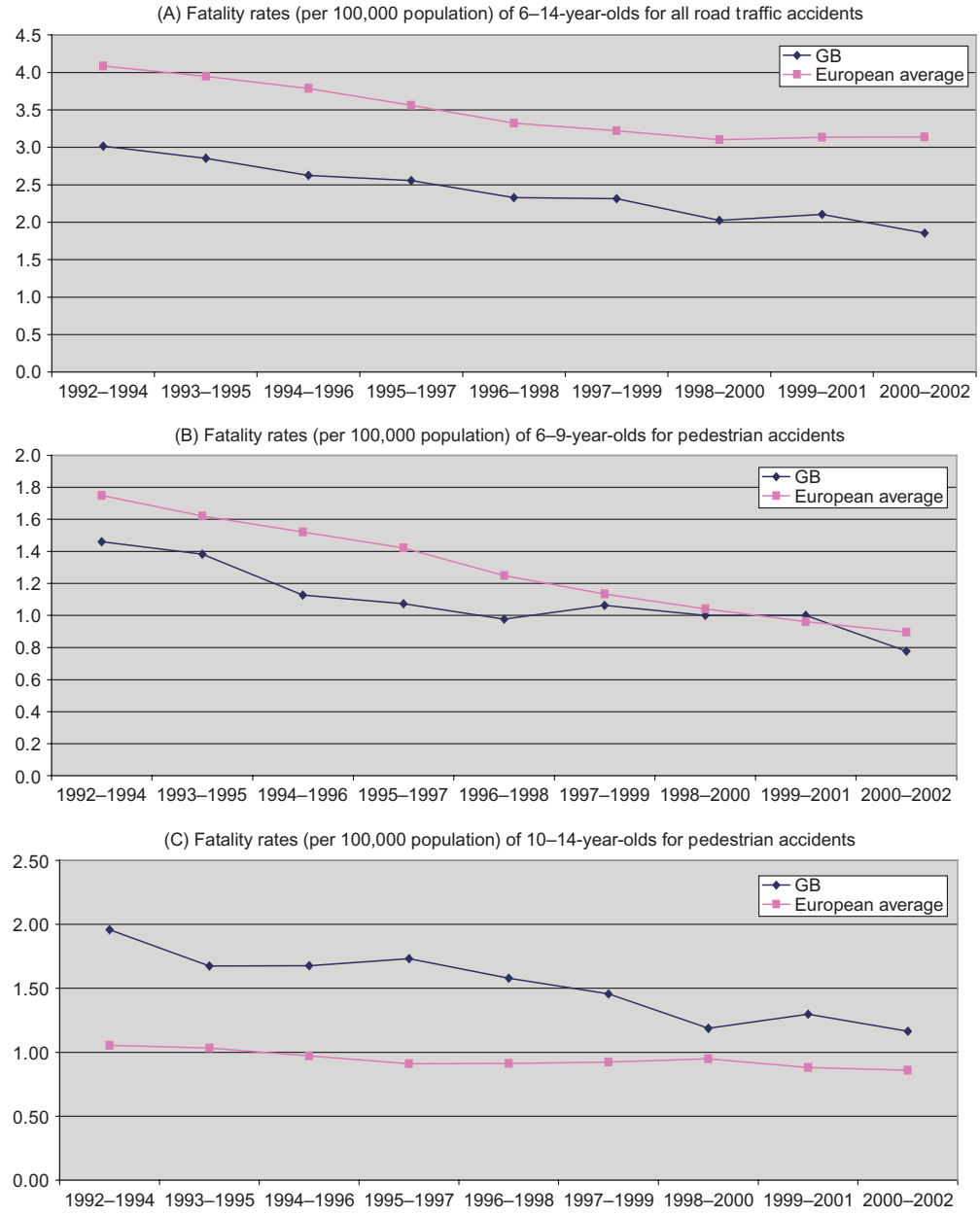
The Road Safety Division (RSD) of the Department for Transport (DfT; formerly the Department for Environment, Transport and the Regions (DETR)) was keen to understand the reasons for these differences. Against this background, the RSD commissioned MVA Ltd and the Institute of Transport Studies at the University of Leeds to undertake a comparative study of child pedestrian accidents and exposure to risk in Great Britain, France and the Netherlands. The study was commissioned in 1997 and completed in 1999.

The aim of the research was to understand the differences in exposure and accident rates of 5–15-year-olds within similar road environments and, by identifying the factors that might explain higher accident rates in Great Britain, to assess the implications for policy.

The report of this study included a macro-level comparative analysis which accounted for significant differences in child pedestrian fatality rates between Great Britain and our European counterparts. A copy of the Final Summary Report of this study is included in Appendix B. The key findings from this study can be summarised as follows:

- Differences in total exposure cannot account for the higher child pedestrian accident rate found in Britain compared with other countries. There appears to be very little difference between the total amount of time children spend near roads in the three countries, and children in Britain cross roads less frequently than in other countries.
- Different distributions of this exposure across the different road environments do account for perhaps half of the overall difference between the countries. In particular, children in Britain spend more time near, and undertake more road crossing activity in, more major roads, wider roads, roads with higher flows of traffic and roads of higher speeds than children in France and the Netherlands.
- There are also apparent behavioural differences between British children and those in the other countries, which could increase the accident risk in Britain relative to the other countries:
  - British and Dutch children are more likely to use unmarked crossings than those in France;
  - British children are more likely to cross mid-block than those in either of the other countries; and
  - children in France are more likely to be accompanied by an adult,

Figure 1 Great Britain's road safety record compared with other european countries



while those in Britain are more likely to be accompanied by other children.

- The use of special measures to slow traffic (including formal traffic calming schemes) is very prevalent in the Netherlands, but is less common in Britain or France.

More recent data indicate that the GB record on child pedestrian safety is improving, and that the rate of deaths and serious injuries is now on a par with the average for European countries. There is clearly, however, room for improvement and the Government remains committed to achieving further reductions in child pedestrian casualties.

The study provided a rich database of children's travel patterns, their characteristics and behaviour, as well as measures of the road environments in which they travel. The DfT considered that it would be useful to explore further potential for using the data, on children's exposure and accident involvement, to help refine policies aimed at improving child pedestrian safety. MVA was subsequently commissioned to undertake additional analyses of the data at a micro level.

It was agreed that further analyses should focus on identifying differences in the patterns of exposure to risk among British children with differing socio-demographic characteristics in comparison with children in the Netherlands and France, and to investigate factors associated with differences in exposure in the three countries. The study focused on particular activities: e.g. journeys to school, journeys to and from visiting friends, and playing/hanging around in the street. The findings were also compared with those from other important studies and sources of data for Britain, and additional analysis of the STATS19 data, which records information on all road accidents in Britain involving personal injury reported to the police, was carried out.

This report presents the results and conclusions drawn from this micro-analysis of the original 1999 dataset.

The main findings from this mirco-analysis are summarised below.

Total exposure

The original study found that there was very little difference between the countries with regard to children's total time spent walking near roads, with daily averages of 25.7 minutes in Britain, 26.7 minutes in France and 25.0 minutes in the Netherlands (and in terms of road crossings British children had less exposure, with 5.0, 6.7 and 8.6 crossings on average in the rewalked journeys in each country respectively). In addition, Dutch children spent an average 17.9 minutes cycling, compared with only 2.3 minutes in Britain and 3.5 minutes in France.

Walk times to school are shorter in the Netherlands than they are in Britain or France, but this may be because the longer journeys are made by cycle. In Britain boys take much longer to walk to school than girls. Younger children are more likely to walk to school than older children.

A quarter of British children walked and cycled to visit friends on the survey day, compared with 38% of Dutch children and 17% of French children. Of those that do visit friends, British and French children spend more time doing so than Dutch children. In Britain and the Netherlands girls are more likely to visit friends than boys, but there is little difference in France. In Britain and France older children are more likely to visit friends than younger children, but there is little difference in the Netherlands.

Twenty per cent of children in Britain reported playing or hanging around in the road environment by either walking or cycling, much the same as the 17% in France but much less than the Dutch children (45%).

In all the countries boys are more likely to have played in the road environment than girls, but the differences are small in Britain and France, as are the differences between the age groups. However the differences are much stronger in the Netherlands, where 45% of children in the 5–9 age group played in the road environment compared with only 21% of 12–15-year-olds, and in the older age group 33% of girls report playing compared with only 22% of boys. There are also stronger differences between the age groups in Britain and France in the *time* they spend playing, with older children spending much more time than younger children, though the reverse is true in the Netherlands. Boys and girls in Britain spend similar times playing, whereas in the other countries boys spend substantially more time than girls.

Exposure to the different types of road environment

The original study concluded that children in Britain spend more time near, and undertake more road crossing activity in, more major roads, wider roads, roads with higher flows of traffic and roads of higher speeds than children in France and the Netherlands.

The results of this study show that children in Britain are significantly more likely than children in the other countries to walk to school along more major through roads, with higher traffic volumes and faster traffic, and they are less likely to be subject to speed limits lower than the standard urban limit.

The exposure of British children to major roads and busy roads when visiting friends is much less than it is for overall pedestrian activity, and is much more similar to that in the other countries. However, the greater likelihood of being in the presence of low speed limits in other countries persists.

When looking at ‘playing’ or ‘hanging around’, British children are no more likely to be playing near main roads than those in other countries, and in Britain and France there is a surprisingly high use of cul-de-sacs. Traffic is lighter and slower than for walking exposure generally.

The use of marked crossings

Over three-quarters of children's road crossing movements in both Britain and the Netherlands are at unmarked sites, compared with only a third in France. However, it should be noted that the level of provision of marked crossings in each country is not known.

Children walking to school in Britain or the Netherlands were much more likely to cross the road at an unmarked place than in France, but again the caveat about provision of crossings in each country applies.

British children are even more likely to cross the road at an unmarked place when visiting friends and relatives than they do overall, at 90% of crossings, compared with 37% in France and 15% in the Netherlands, perhaps reflecting that these journeys tend to be away from main roads.

In Britain and the Netherlands the use of unmarked crossings is much less common in play then for walking in general, whereas in France it is considerably greater.

The prevalence of special measures

Special measure to reduce speeds are much more prevalent in the Netherlands, at 50% of exposure in terms of time, than they are in Britain and France, where they are present for about 15% of time exposure and 10% of crossings. The types of measures encountered in the Netherlands include road humps; artificial curves; pinchpoints near islands; special road surfaces; and speed cameras.

When looking at the journey to school, the most remarkable difference is the presence of special measures (other than speed limits) to slow traffic down. This is more common in Britain, at 19%, than in France, at 11%, but in the Netherlands 54% of exposure was in the presence of special measures.

The incidence of special measures when visiting friends is even higher in the Netherlands than overall and was only 4% in Britain.

Special measures to slow speeds are slightly less likely to be present in the Netherlands for play than overall, but are still much more prevalent than in Britain and France.

Accompaniment

In terms of average exposure time, children in the Netherlands are most likely to be alone, children in France are most likely to be accompanied by a person of 16 or over and children in Britain are most likely to be accompanied by other children.

Girls are less likely to be alone than boys, and younger children are less likely to be alone than older children in all countries.

On the journey to school, children in Britain are less likely to be accompanied by either adults or friends than is the case in France and the Netherlands. Younger children are much more likely to be accompanied by an adult than older children in all the countries, and girls slightly more so than boys.

When visiting friends, children in the Netherlands are less likely to be accompanied by someone of 16 or over than in other countries, while children in Britain are more likely to be accompanied by other children.

Children in the Netherlands are more likely to play alone than in the other countries, but 15% of British children and a remarkable 34% of French children are accompanied by people of 16 or over when playing.

Other British studies

Several previous surveys of child pedestrian exposure were found to support the findings from this study. These were discovered following a search of published reports from studies conducted over the last 10 years that were identified as potentially relevant following consultations at the scoping study stage. Key findings where corroborating evidence was found include the list in the following table:

MVA findings	Other studies that have similar findings
Secondary school children spent more time per walked journey compared to primary school children	NTS (1997/99) Towner *et al.* (1994) Tight (1987)
Girls are more likely to be accompanied than boys	NTS (1997/99) Towner *et al*. (1994) Hillman *et al*. (1990) Tight (1987)
Younger children are more likely to be accompanied than older children	NTS (1997/99) Towner *et al*. (1994) Tight (1987)
Around half of children walk to school	NTS (1997/99) Towner *et al*. (1994) Hillman *et al*. (1990) Tight (1987)
Boys take longer on the school journey compared to girls	Towner *et al*. (1994) Tight (1987)
Younger children are more likely to walk to school than older children	NTS (1997/99) Towner *et al*. (1994) Ward *et al*. (1994) Hillman *et al*. (1990) Tight (1987)
Children from the lowest socio-economic group are more likely to walk on the school journey	Towner *et al*. (1994)
Children from low socio-economic groups are less likely to travel by car	Towner *et al*. (1994)
Boys are much more likely to cycle on the school journey compared to girls	NTS (1997/99) Towner *et al*. (1994) Tight (1987)

References for studies listed above

Hillman M, Adams J and Whitelegg J (1990). *One false move: a study of children's independent mobility*. London: Policy Studies Institute.

National Travel Survey (NTS) (1997/99). www.transtat.dtlr.gov.uk

Tight MR (1987). *Accident involvement and exposure to risk for children as pedestrians on urban road*s. PhD Thesis. University College London.

Towner EML, Jarvis SN, Walsh SSM and Aynsley-Green A (1994). Measuring exposure to injury risk in schoolchildren aged 11–14. *British Medical Journal* **308**: 449–52.

Ward H, Cave J, Morrison A, Allsop R and Evans A (1994). *Pedestrian activity and accident risk*. AA Foundation for Road Safety Research, Basingstoke.

Severity of casualties

Amongst the various factors associated with higher severity rates, those connected with vehicle speed are the most influential. In particular there is a strong association with speed limits at the accident sites; the higher the speed limit, the higher the severity.

Other factors associated with increased severity are accidents that happened in darkness and at weekends, accidents where heavy vehicles were involved, and accidents away from junctions. Adverse weather conditions were associated with slightly lower severity.

Severity rates generally did not vary greatly by age, although girls aged 5–9 had slightly lower severity accidents than those aged 12–15.

The number and severity of child pedestrian accidents has declined since the mid-1990s.

Implications for policy makers

Children in Britain spend more time near, and undertake more road crossing activity in, more major roads, wider roads, roads with higher flows of traffic and roads of higher speeds than children in France and Netherlands. This is largely the result of different land use and activity patterns in Britain and their relation to the road hierarchy. Land use and highway design and policy can be used to affect these distributions, but it is important to continue applying Urban Safety Management Techniques to major roads, and to ensure that safety education and training adequately prepare all road users, including children, for the dangers.

The study also suggests that in Britain road safety policy could focus on road crossing activity, as there are some question marks over British children's crossing behaviour. British and Dutch children are more likely to use unmarked crossings than those in France, and British children are more likely to cross mid-block than in either of the other countries. It is therefore important for road safety education to encourage appropriate choices of where to cross. Moreover, children in France are more likely to be accompanied by an adult, and those in Britain are more likely to be accompanied by other children. However, this is a complex issue and it should be noted that children in the Netherlands spent more time walking alone than their French and Dutch counterparts.

Other areas that road safety policy should focus on in Britain are distributor and residential roads, and the behaviour of children crossing the road at or near junctions, where the estimated risks per unit exposure seem significantly higher in Britain than in other countries.

Children in Britain spend a much larger fraction of their exposure on main roads and, although these are associated with no higher risk than in other countries, it is obviously sensible to ensure that road safety education in Britain places suitable emphasis on the dangers of main roads and encourages appropriate behaviour in proximity to heavy flows of traffic.

It is clear that lower speed limits apply to a greater proportion of child exposure in France and the Netherlands than in Britain. Hence the study suggests that the issue of speed limits in residential areas merits policy consideration.

1 Background and objectives

1.1 Background

1.1.1 Overall Britain has an excellent record in road safety with fewer deaths and injuries per population, per vehicle or per kilometre travelled than most other countries in Europe or elsewhere in the developed world. However, in the 1990s the number of child pedestrian fatalities per 100,000 of the population was considerably larger than the average for EU countries. The Road Safety Division (RSD) of the DfT has been keen to understand the reasons for these differences in accident rate and to identify ways of improving child pedestrian safety in Great Britain. More recent data indicate that the British record on child pedestrian safety is improving, and that the rate of deaths and serious injuries is now on a par with the average for European countries. There is clearly, however, room for more improvement and the Government remains committed to achieving further reductions in child pedestrian casualties.

1.1.2 In 1997, MVA Ltd and the Institute for Transport Studies at the University of Leeds were commissioned by the RSD to undertake a comparative study of child pedestrian accidents and exposure to risk in Great Britain, France and the Netherlands. This study, which was completed in 1999, was designed to provide reliable quantitative estimates of exposure and accident risks in a comparable format across the three countries. The aim of the research was to provide well-grounded explanations of differences in the overall accident rates between the three countries.

1.1.3 The study achieved this very effectively by demonstrating key differences in overall child pedestrian fatality rates between the countries at a high level of significance. The report included a macro-level comparative analysis to account for significant differences in child pedestrian fatality rates between Great Britain and our European counterparts. A copy of the Final Summary Report of this study is included in Appendix B.

1.1.4 The study provided a rich database of children's travel patterns, their characteristics and behaviour, as well as measures of the road environments they travel in and the circumstances of the most serious child pedestrian accidents. Appendix C provides copies of the survey questionnaires.

1.2 Objectives

1.2.1 The DfT considered that it would be useful to explore the further potential for using this data, alongside other sources of data on child's exposure and accident involvement, to help refine policies aimed at improving child pedestrian safety. Accordingly, MVA was commissioned to undertake additional analyses of the data at a micro level. It was agreed that the further analyses should focus on identifying

differences in the patterns of exposure to risk among British children with differing socio-demographic characteristics, in comparison with children in the Netherlands and France, and to investigate factors associated with differences in exposure in the three countries. The findings would also be compared with those from other important studies and sources of data for Great Britain, and additional analyses of STATS19 would be undertaken.

1.3 The structure of this report

1.3.1 Following this introduction, the main report is structured as follows.

1.3.2 Chapter 2 examines patterns of exposure to risk in respect of all journeys made by children, and Chapters 3 to 5 then focus on particular activities: journeys to school; journeys to/from visiting friends; and playing or hanging around in the street. In each chapter the types of journey being made have been analysed in terms of the following:

- the proportions of children that make journeys by different modes, according to children's socio-demographic characteristics — these are based on analysis of the one-day activity diary data;
- the time spent making journeys by foot, and the patterns of accompaniment, again according to socio-demographic characteristics with analysis based on the one-day activity diary; and
- an analysis of exposure to different types of road environment, which is based on the selected trip/walk stage which was investigated in great detail in the survey.

1.3.3 Chapter 6 then investigates factors affecting the severity of child pedestrian accidents using STATS19 data. This analysis was prompted by a wish to check the general validity of comparisons of accident risks across the three countries in the original study, and in order to ensure comparability these compared killed or seriously injured (KSI) accidents only. The analysis, however, goes further than this, examining the influence of a range of factors on patterns and trends in the severity of child pedestrian accidents in Great Britain.

1.3.4 Finally, Chapter 7 assesses the consistency of the findings from this study with those from several other British studies and sources of data on child pedestrian exposure and risk.

1.3.5 Summaries of the main findings are included at the end of each chapter.

1.3.6 The appendices contain:

- a series of tabulations providing additional detail and results from the analysis undertaken;

- a summary of the main findings and conclusions from the original study, with a description of the survey methodology; and
- copies of the original questionnaires for the accident site survey and the exposure survey.

2 All journeys

2.1 Introduction

2.1.1 This chapter considers the children's total exposure to road traffic, for all journey purposes, and including any time spent playing or hanging about near to roads while not on a purposeful journey. The original comparative study[1] made quantitative estimates of the risk in different road environments and different aspects of behaviour, also in relation to total exposure. The major findings in regard to exposure will be summarised here, even though this repeats the material in the original report, since it sets the scene for the discussion of exposure in specific types of activity in the later chapters. Information on the incidence of accidents, and subsequent estimates of risk, are not given here, since this analysis focuses on aspects of *behaviour* in more detail than could be included in the original study.

2.1.2 The surveys of exposure were able to include aspects of the children's behaviour which were not recorded in the accident records, and which could not therefore be included in the estimation of risk. Where especially relevant, the data will be illustrated in bar chart comparisons. Otherwise, the complete tabulations are appended, and reference may be made to them to check the quantitative basis for the discussion in the text.

2.1.3 Exposure has been measured in two different ways: in terms of the estimated time spent in a particular activity or location, and in terms of the number of roads crossed. To avoid unnecessary repetition, exposure will be quantified in terms of time and it can be assumed that the number of crossings presents a similar finding, unless the text refers specifically to crossings exposure.

2.2 Total exposure

2.2.1 The original study found that there was very little difference between the countries in the children's total time spent walking near roads, with daily averages of 25.7 minutes in Britain, 26.7 minutes in France, and 25.0 minutes in the Netherlands (and in terms of road crossings British children had less exposure, with 5.0, 6.7 and 8.6 crossings on average in the rewalked journeys in each country). In addition, Dutch children spent an average 17.9 minutes cycling, compared with only 2.3 minutes in Britain and 3.5 minutes in France. Thus, whichever way exposure is measured it is less in Britain than in the other countries

2.2.2 Figure 2.1 shows the percentages of children who walked and cycled on the day surveyed. About two-thirds of children in Britain and France reported walking on the survey day, with about 4% cycling. In the Netherlands significantly fewer

[1] Bly PH, Dix M and Stephenson C (1999). *Comparative Study of European Child Pedestrian Exposure and Accidents* London: Department of Transport/MVA.

Figure 2.1a Percentage that walk only

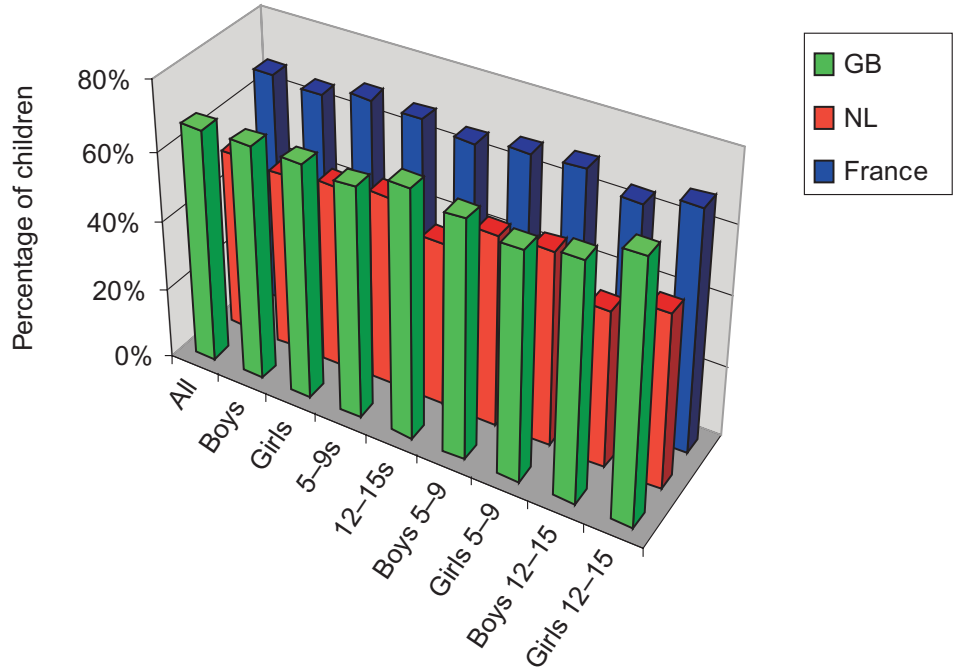
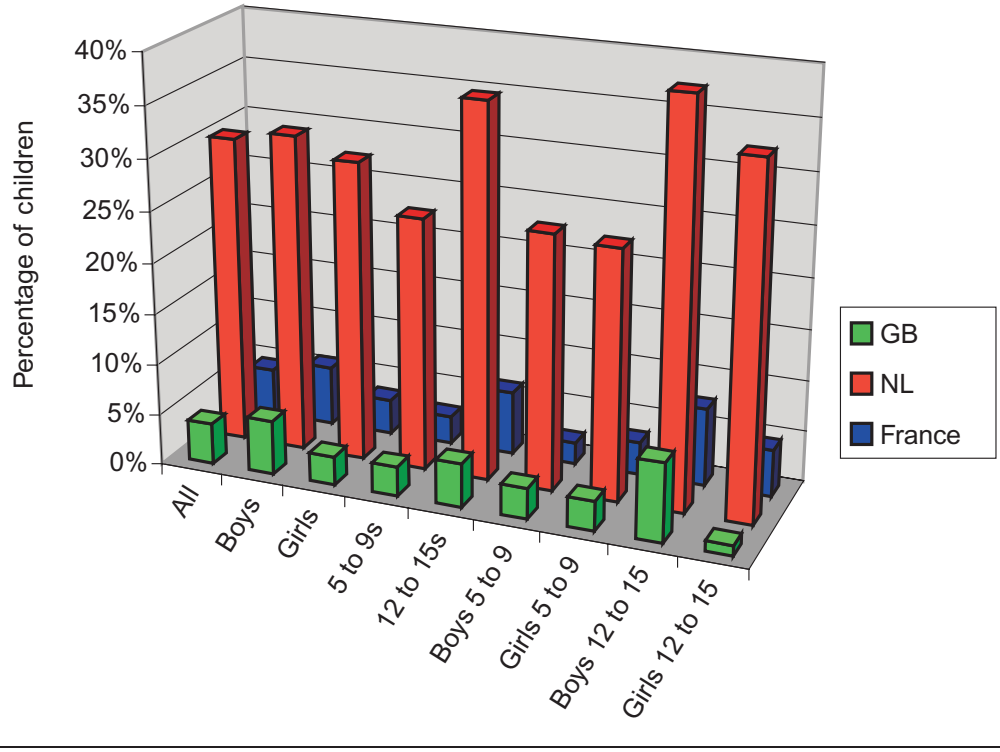


Figure 2.1b Percentage that cycle only



walked, at 52%, but 30% cycled. The sum of the percentages walking and cycling is about 70% in Britain and France, and 80% in the Netherlands, but of course there is overlap between the two modes with some children both walking and cycling, and it is likely that similar proportions of children engaged in either walking or cycling, or both, in all three countries. Rollerblading is another mode that exposes children to road traffic, but the numbers are too small for statistical analysis: only 0.7% of children record any rollerblading in Britain, 1.5% in France and 1.8% in the Netherlands. It is approaching the levels of cycling in Britain and France, but in those countries cycling is also at too low a level to provide useful analysis for the most part. It is of interest, however, that to the extent that children in the Netherlands are more likely to walk or cycle, they also use the car less: the percentages of children who have made a car trip on the survey day are similar in both Britain (22%) and France (20%), but only 13% of Dutch children had made a car journey.

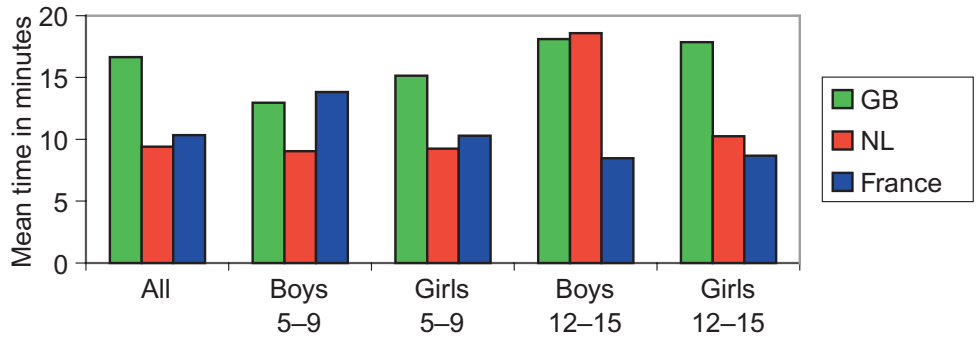
2.2.3 Of course, all children will have done some walking, even if indoors, but it seems that a quarter, or more, did not walk alongside roads on their survey day. Those who did spent about 16.7 minutes per journey in Britain, though the distribution is very long-tailed, with a standard deviation of 36 minutes, indicating that while many children made short journeys, a few spent very long times walking. Interestingly, in all three countries the standard deviation is substantially larger for boys than girls (39, 44 and 35 minutes for boys in Britain, France and the Netherlands respectively, compared with 20, 26 and 23 minutes for girls) because although boys and girls spend much the same time walking on average, boys are more likely to walk the longer distances (or at least the longest times – when playing, the mean speed may be low). In France and the Netherlands the mean walking times, for those who reported walking, were 10.3 minutes and 9.4 minutes per journey respectively, substantially (and statistically significantly) less than in Britain (see Figure 2.2), which might reflect the rather lower density and more dispersed patterns of development here.

2.2.4 Most of this exposure is accounted for by three categorisations of activity which will be discussed separately in Chapters 3 to 5.

2.3 Variation by age and gender

2.3.1 Variation by sex and age is fairly small, as Figure 2.1 shows, and for the most part the differences are not statistically significant. Boys are more likely to cycle than girls in Britain and France (5.3% versus 2.8% in Britain; 5.8% versus 3.4% in France), but there is hardly any difference in cycling between the sexes in the Netherlands, where 31% of boys and 29% of girls cycle – this may well be connected with the view of the cycle as a plaything in Britain and France, but more as a transport mode in the Netherlands (Chapter 5). Older children are more likely to cycle on the roads (or, at least, in the road environment) than younger children, as one might expect, in all three countries (4.3% versus 2.9% in Britain; 6.2% versus

Figure 2.2 Mean time per walking journey – all purposes



2.7% in France; 37% versus 25% in the Netherlands), and older boys are more likely to cycle than older girls in all the countries. In walking, though, there are no clear differences, with only a few percentage points between girls and boys, younger and older, and without any consistent trends across the countries. In Britain, younger girls are less likely to walk than younger boys, but older girls are more likely to walk than older boys, though this latter difference is compensated by greater cycling; and in France and the Netherlands older boys walk more than girls despite also cycling more. But the uncertainty in the data also amounts to a few percentage points, and any differences in walking, as distinct from cycling, are not significant. For those who did walk, however, there are significant differences by age in the *time* spent per walked journey (see Figure 2.2). In Britain (14.1 minutes for the 5–9 age group compared with 18.0 minutes for 12–15-year-olds) and the Netherlands (9.1 and 14.1 minutes respectively, though this difference is not statistically significant), older children spend more time walking than younger children, as one might expect, whereas in France younger children spend 12.0 minutes walking compared with 8.6 minutes for older children, a significant difference. Of course, time is not the same as distance, and older children in France may still walk further from home, but from the point of view of accident prevention it is the exposure that counts and the type of environment, rather than distance.

2.4 Socio-economic group

2.4.1 Children were categorised by an assessed socio-economic grouping related to the different standard categorisations used in each country, with four categories in Britain (AB, C1, C2 and DE), three in France and five in the Netherlands. There are few distinct trends across the socio-economic groups in the percentages of children walking. Neither walking nor cycling shows any very consistent pattern across different socio-economic groups (SEGs), but in Britain the higher group AB shows fewer children walking and the lower group DE shows more children walking, while in France the lowest of the three groups again shows more children walking and, in this case, markedly fewer children cycling, though the latter is unlikely to be statistically significant. In the Netherlands there is a slight increase towards the lower groups in walking, and a decrease in cycling, but the trend is barely

significant. In general, though, these differences accord with expectations, since there is likely to be a greater ability in the higher SEGs, and a greater need linked to a more suburban environment, to ferry children by car rather than to allow them to walk.

2.4.2 Figure 2.3a shows the mean *times* spent per walk journey for those children who walked. The picture is least clear in Britain, where children in group AB spend 29 minutes and those in DE 12 minutes, but children in the intermediate C1 spend 12 minutes and those in C2 18 minutes, so there is no simple monotonic trend. Walking times in France show a clearer trend to shorter walking times with lower SEG, with 13, 10 and 7 minutes across the three groups, but although there is a convincingly consistent trend from high to low SEGs (4, 7, 10, 12 and 14 minutes from highest to lowest group) in the Netherlands it is in the opposite direction to that in the other countries. In general the trend might be more obviously explained in Britain and France, where to the extent that lower SEGs live in more urban environments they will need to walk shorter distances, but the long tradition of apartment living in France leaves a less clear distinction between social groups there than in Britain. As other chapters will show, there is generally a less clear difference between the SEGs in the Netherlands in many aspects of child exposure than in

Figure 2.3a Mean time spent per walk journey by SEG

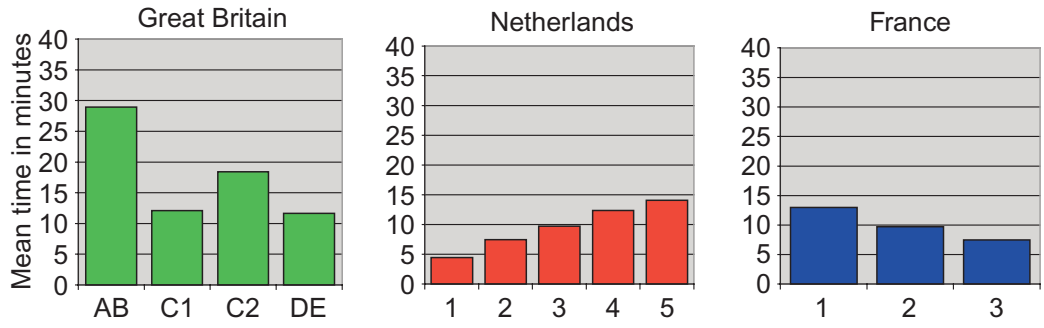
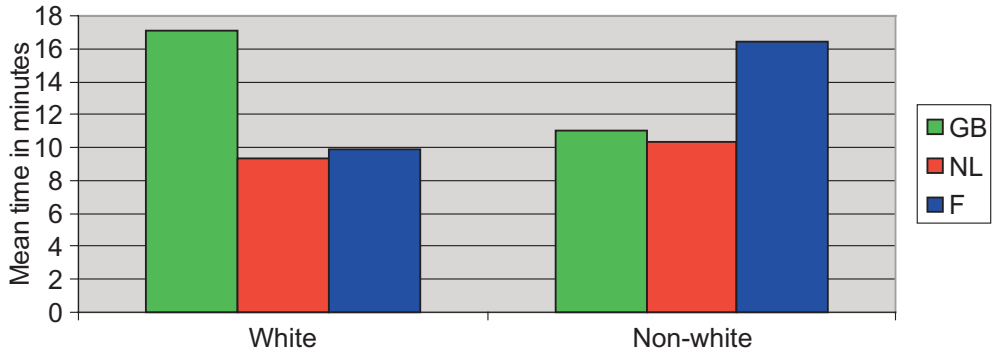


Figure 2.3b Mean journey time spent per walk journey by ethnicity



either of the other countries. It should be noted that there are definitional differences in SEG between the three countries, but it is possible to make comparisons between the countries on the basis of higher and lower SEGs. It is possible that the children in the higher SEGs are more likely to be allowed to walk close to home, where the environment may be protected (see the section on the road environment below), but for longer journeys they are taken by car. But, as noted above, the time spent walking by children is not necessarily a good indicator of distance, since travel and play are often indistinguishable. Thus, although the trends are fairly clear, the explanation is not.

2.5 Ethnicity

2.5.1 In all three countries (Figure 2.3b) non-white children are more likely to have walked than white children (75% versus 67% in Britain; 71% versus 68% in France; 58% versus 52% in the Netherlands), though given the small sample sizes for non-white these differences are barely significant. In any case, they disappear when cycling is included, since non-white children are much less likely to cycle (0% versus 4% in Britain; 1% versus 5% in France; 24% versus 30% in the Netherlands). In these respects they share similar attributes to children in the lower SEGs, and in safety research in general it is difficult to distinguish the effects of ethnicity from those of SEG. In Britain and the Netherlands this is also true of the mean *time per walk journey* for those who walked, with non-white children spending less time walking than white children in Britain, and more time in the Netherlands: these trends are in opposite directions, but they match those across the respective SEGs. In France, by contrast, non-white children spend very substantially *more* time walking than white children (16 versus 10 minutes), whereas children in the lowest SEG in France spent only 7 minutes against 13 minutes in the highest SEG. The sample size for non-white is over 400 in France (and 330 and 170 in Britain and the Netherlands respectively) so this difference is significant. It suggests either a very different behaviour or a substantially different pattern of location from white children.

2.6 Housing

2.6.1 There are few consistent differences by housing type, except that children living in apartments in France are more likely to have walked than children living in houses (71% versus 63%), while children living in apartments in the Netherlands are more likely to walk if the frontage is closer than 3 metres to the road (58% versus 45%) and in Britain children living in houses are more likely to walk if the house frontage is closer than 3 metres to the road (71% versus 64%). All this might be explained by walking being more likely in more urban situations, but the effect of the distance of the frontage from the road is not apparent in apartments in Britain (though flats close to the road do show substantially less walking *time*) or houses in the Netherlands. There is some consistency in the age of housing across the countries, with children in houses dating from before 1920, and from 1945–65, being more

likely to walk than those from either 1920–45 or post-1965 houses, but given the variability of house types in any age this is not readily interpreted. In Britain, at least, it might be that the extensive council estates constructed in the post-war era are more conducive to walking, or are occupied by lower SEGs with lower car ownership, but it seems unwise to read much into these differences.

2.7 The type of area

2.7.1 In Britain and France it was possible to classify the areas surveyed for exposure according to whether they were primarily in a large 'city', medium-sized 'town' or essentially 'rural'. This was not possible for the Dutch data. Children living in cities are more likely to have walked in both Britain (71%) and France (75%), with children in rural areas least likely to have walked (64% and 62%). In both countries, children living in rural areas were more likely to have cycled (6% in Britain and 8% in France versus 3% in other types of area and only 1% in French cities). However, when it comes to the time spent walking, those living in rural areas spend more time walking in Britain (26 minutes) with those living in cities spending the least time walking (23 minutes versus 25 minutes for those living in towns). In France there is little variation by type of area, with 28 minutes in cities, 27 in rural areas and 26 minutes in towns.

2.7.2 Comparing younger children with older children in Britain, the per cent who had walked was very similar in cities and rural areas but in towns older children (75%) were more likely to walk than younger children (67%). In the cities and rural areas of Britain, older children (4.7% and 7.4%) were more likely to cycle than younger children (2.4% and 3.3%). In all area types, younger children spent less time walking than older children, the biggest difference being in cities where older children spent 32 minutes walking compared with 17 minutes for younger children.

2.7.3 In France, the per cent who had walked was very similar in all three area types. In the towns and rural areas of France, older children (4.7% and 11.1%) were more likely to cycle than younger children (2.0% and 4.0%). In all area types, older children spent less time walking than younger children, the biggest difference being in cities where older children spent 30 minutes walking compared with 22 minutes for younger children.

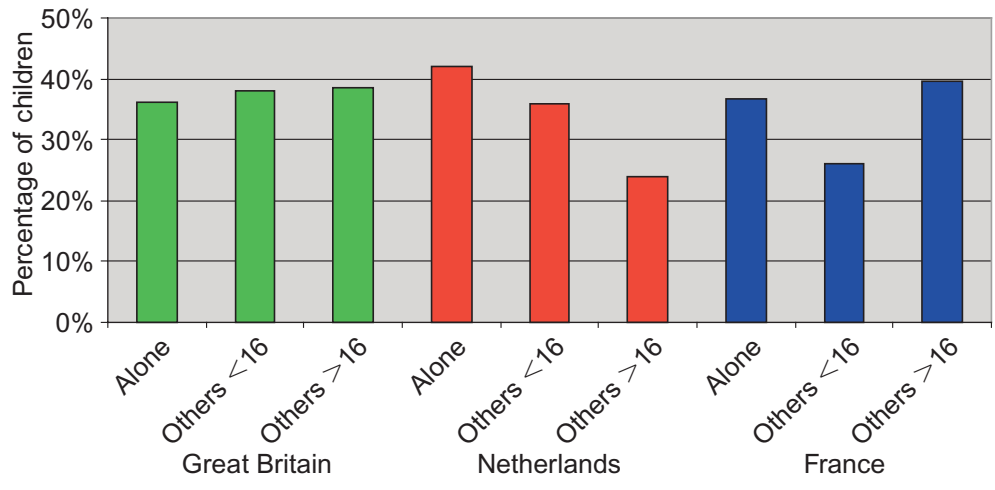
2.8 Accompaniment

2.8.1 The original study (Bly *et al*. 1999) showed that, as a percentage of exposure time, children were more likely to be alone in the Netherlands (31% of time but 40% of crossings) than in Britain (28% of time and 26% of crossings) or France (24% of time and 28% of crossings). Children in France were the most likely to be accompanied by an adult (or, at least, someone of 16 or over who is presumed to be more 'responsible' in traffic behaviour – they will be referred to as 'adults' here for simplicity), with 37% of time exposure and 40% of crossings, compared with 33%

of time and 35% of crossings in Britain, and 29% of both time and crossings in the Netherlands. Children in Britain, however, are more likely to be with other children (under 16) (39% of time and 37% of crossings) than children in France (32% and 23% respectively) or the Netherlands (34% and 26%). On the assumption that the presence of an adult is likely to enhance safety, while the presence of other children might distract attention and reduce safety, the net effect of accompaniment might be to reduce children's safety in Britain relative to the other countries, though no quantitative estimate of this effect could be made.

2.8.2 Rather than repeat this analysis, the data examined here is different in its construction from that given previously. Percentage accompaniment refers to the percentage of *children*, rather than exposure *time*, reporting a particular class of accompaniment on the surveyed day, and a single child may be recorded in more than one category if, during the day, he or she walked on different occasions with different accompaniment. Thus there is overlap between the categories and they do not sum to 100%. On this basis, Figure 2.4 shows that children in the Netherlands are still most likely to make a walk trip alone (42%), but the margin is fairly small, with 36% of children in both Britain and France making walk trips alone. However, the most marked difference in exposure was for road crossings, and this detail is lost at the trip level. There is little difference between Britain and France in the likelihood of children being accompanied by someone of 16 or over (both about 39%), but children are much less likely to be accompanied by an older person in the Netherlands (24%). Conversely, children in France are much less likely to be with other children (26%) than in Britain (38%) or the Netherlands (36%). The pattern of accompaniment on a trip basis is different from that on a time basis, but it remains clear that, on the whole, children in the Netherlands are more likely to be alone, and are less likely to be accompanied by an adult, than in the other countries. At the trip or activity level, children in Britain seem no more likely than Dutch children to be with other children, but their time exposure is greater, and in relation to road safety it is likely to be exposure *time* that counts.

Figure 2.4 All purpose accompaniment by country



2.8.3 As would be expected, girls are less likely to be alone than boys in all countries, by a margin of 10–15%, and the younger age group are less likely than the older age group by about 30%. Conversely, younger children are much more likely to be accompanied by an adult than are older children in all countries, and girls more than boys, though there is little difference between the sexes in the Netherlands. Amongst older children, too, girls are more likely to be accompanied by an older person in France and the Netherlands, but not in Britain where 15% of boys are accompanied by an older person, compared with only 10% of girls.

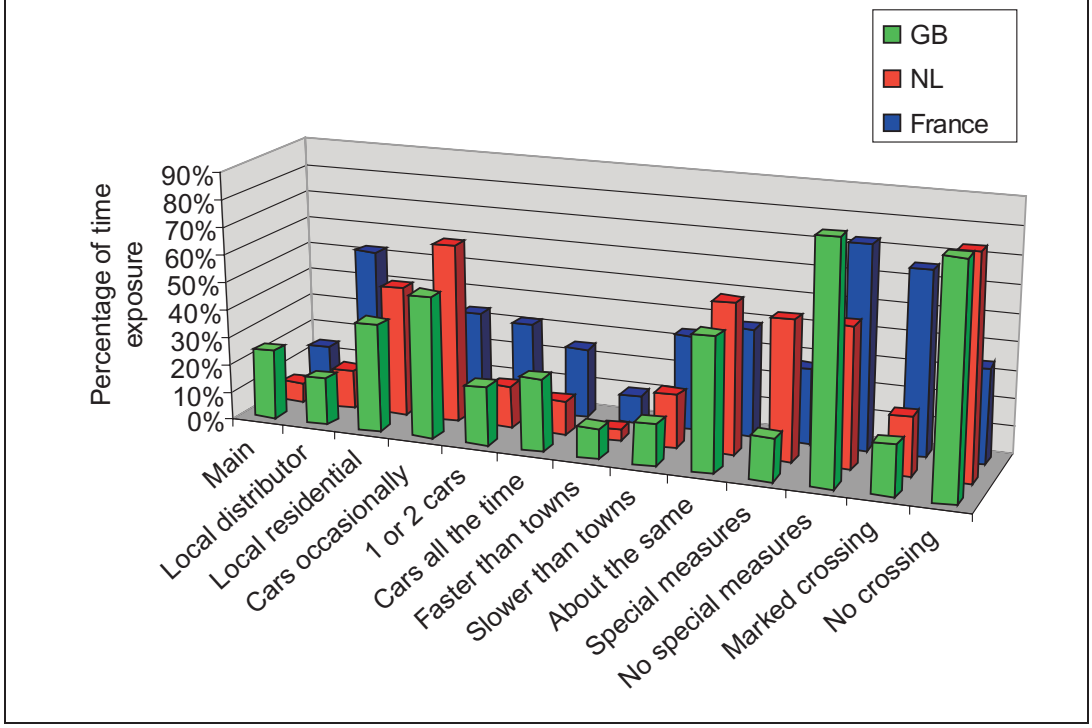
2.8.4 There is little difference between the sexes in accompaniment by other children. Overall, then, the picture is complex, but there is a markedly greater tendency for children in the Netherlands, and especially younger children, to be walking unaccompanied, and for the younger children to be out walking with other children, than in either Britain or France.

2.8.5 Looking at accompaniment by the type of area in France, the per cent of children on their own does not vary by area, however those living in rural areas are more likely to be with other children (33% in rural areas compared with 25% in towns and 21% in cities). While accompaniment by an older person is much greater in cities (44%) and towns (42%) than in rural areas (33%).

2.9 The road environment

2.9.1 It is clear that a significantly larger fraction of British children's exposure to traffic is on more major roads than in the other countries, as Figure 2.5 shows. Approximately a quarter of British exposure is to main through-roads, compared with 15% in France and only 5% (crossings) to 7% (time) in the Netherlands. Similarly, the roads to which British children are exposed are judged to be busier in Britain than in the Netherlands (26% of British children's exposure is with vehicles 'passing all the time' compared with only 12%), while traffic is judged to be 'faster than most traffic in towns' for 11% of British exposure, compared with 4% in the Netherlands (but 10% in France), and 'slower than most traffic in towns' for 15% of exposure, compared with 34% in France and 19% in the Netherlands (25% for crossings exposure). Also, more of the exposure is on roads subject to lower speed limits in France and the Netherlands: in Britain only 2% of time exposure is subject to speed limits less than the urban standard 30 mph limit, whereas in France 15% and in the Netherlands 22% of exposure time (and very similar percentages of numbers of road crossings) are at lower speed limits. All these aspects, as summarised in Figure 2.5, suggest that British children have a greater exposure to riskier road environments than in the other countries: this higher risk is quantified in the original report (Bly *et al*. 1999), where it is found to explain a substantial portion of the higher child pedestrian accident casualty rate in Britain as compared with France or the Netherlands.

Figure 2.5 Percentage time exposure by road type, traffic volume, speed, measures to slow traffic and crossing place



2.9.2 A major difference between the Netherlands and either Britain or France is the much higher prevalence of special measures to reduce speeds in the Netherlands. Half of the exposure there, whether in time or the number of crossings, is in the presence of special measures of some sort, compared with 15% of time exposure and 10% of crossings exposure in Britain, and 14% (time) and 11% (crossings) in France. The measures are not necessarily formal traffic calming (they include, for example, speed cameras), but 27% of the exposure in the Netherlands are in the presence of road humps, 5% are near artificial curves or chicanes, 8% are near pinchpoints and 4% are near special road surfaces. The protected residential areas, or 'Woonerfs', are well-known and have been widely studied. This approach may account for the fact that in Britain 90% of children's exposure is limited to the pavement, whereas in the Netherlands only 68% of activity is on the pavement and 22% is on the road or on both the pavement and the road, and 10% on neither pavement nor road (though in France the figures are 77%, 21% and 1% respectively).

2.9.3 Children in both Britain and the Netherlands are far more likely to cross the road at an unmarked crossing (82% and 79% respectively) than in France (34%). This higher level of use in France is likely to be associated with jay-walking penalties there, though it is also the case that marked crossings are more frequent in urban areas than in the rural areas. However, it should be noted that we do not actually know what the level of provision of marked crossings is in each country. The greater reported use of marked crossings may reduce the risk of accidents, but it is also the

case that the original study (Bly *et al*. 1999) estimated that in Britain and the Netherlands there was a higher risk associated with using a marked crossing than an unmarked crossing, perhaps because children were more aware of danger when not using a marked crossing, while the converse was true in France. Children in Britain were also more likely to cross between junctions (26% of crossings) than in France (13% – which is connected with the use of marked crossings, of course) and the Netherlands (19%).

2.10 Conclusions

2.10.1 Overall, the main points to be drawn from an analysis of all walk journeys are as follows:

- About two-thirds of children in Britain and France reported ***walking*** on the survey day, with about 4% ***cycling***. In the Netherlands, significantly fewer walked, at 52%, but 30% cycled. Given that some children will have both walked and cycled, the proportion exposed to the road environment on any given day is probably similar in all three countries.
- About 20% of children made a ***car trip*** in both Britain and France, but only 13% of Dutch children had made a car journey.
- ***Boys*** are more likely to cycle than ***girls*** in Britain and France, but there is little difference in the Netherlands.
- Overall, the differences in the *proportions* of children walking categorised by age and sex amount to only a few percentage points, but ***older*** children spend more *time* walking (when they do walk) than ***younger*** children in Britain and the Netherlands, while the converse is true in France.
- The ***SEG*** has little effect on the likelihood that children walked on the survey day, but there are stronger trends in the *time* spent walking. This effect is not monotonic across the SEGs in Britain, with the time highest for groups AB and C2, but in France there is a clear trend towards shorter times for the lower SEGs, while in the Netherlands it is the higher SEGs who show the shortest times.
- The walking exposure of ***non-white children*** tends to be similar to that of the lower SEGs, except that in France non-white children who walk spend substantially *more* time walking, whereas children in the lowest SEG spend *less* time walking.
- In Britain and France (comparable information is not available for the Netherlands) those that ***live in cities*** are more likely to walk, but those that live ***in rural areas*** walk for longer.
- In terms of average exposure time, children in the Netherlands are the most likely to be ***alone***, children in France are the most likely to be ***accompanied by a person of 16 or over***, and children in Britain are the most likely to be ***accompanied by other children***. In terms of the proportion of trips, however,

children in the Netherlands are both more likely to be alone and more likely to be accompanied by other children than in the other countries. Children in Britain are the most likely to be accompanied by an adult. By either measurement, children in the Netherlands are the least likely to be accompanied by an 'adult'.

- ***Girls*** are less likely to be ***alone*** than ***boys***, and ***younger children*** than ***older children***, in all the countries. Younger children are more likely to be accompanied by 'adults' than older children in all the countries, and girls are more likely than boys, except in the lower age group in France and the higher age group in Britain, where there is little difference between the sexes.
- British children have a greater exposure, in terms of both the time and the number of roads crossed, to more ***major through-roads***, with heavier and faster traffic; and speed limits lower than the standard urban limits of 30 mph/50 kph are much more common in France and the Netherlands than in Britain.
- ***Special measures to reduce speeds*** are much more prevalent in the Netherlands, at 50% of exposure (in terms of time), than they are in Britain and France, where they are present for about 15% of time exposure and 10% of crossings.
- Over three-quarters of children's ***road crossing*** movements in both Britain and the Netherlands are at unmarked sites, compared with only a third in France.

3 Journeys to school

3.1 Introduction

3.1.1 The journey to and from school is especially important in any study of child pedestrian accidents, since it is an obligatory journey made very frequently to a destination whose choice of location for most children is determined by the state and its local authorities. Apart from the infant and primary years, many of the children that walk to school are likely to be unaccompanied by their parents and are likely to be accompanied for part of the journey by school friends whose presence may divert attention from the danger of an accident. Moreover, in winter either or both outward and return journeys may be in poor light when accident rates may be higher. There is also a general policy interest in encouraging walking on this journey, opposed to ferrying by car, in order to reduce road traffic congestion. For the purposes of this study it provides a particularly convenient category for investigation, since it tends to be a more clearly defined journey than much of the other walking activities of children.

3.2 Proportions by mode

3.2.1 Figure 3.1 shows the percentages of children in the sample who made their journeys to school[2] by the different modes. Overall, the pattern is similar in Britain and France, with 55–60% walking and only one or two per cent cycling, but in the Netherlands although fewer walk (around 35%) the cycle was used by a similar proportion, so that over 70% of children walked or cycled. This difference is reflected in the use of the bus or car to take children to or from school. Car use, whether by parents' car or in a carpool, where often the child may have to walk to a friend's home, is substantially higher in Britain and France than in the Netherlands. The use of public transport or school bus (no distinction was made in the survey) is higher in France and the Netherlands than in Britain. Other things being equal, the greater exposure to road traffic by walking or cycling in the Netherlands would contribute a higher accident risk than in the other countries, but as we saw in the original study (Bly *et al*. 1999) the risk per unit exposure is considerably smaller in the Netherlands.

[2] There is a marked asymmetry in the modes used for the reported journey to and from school, with children in all countries apparently more likely to return from school by walking or cycling than go to school by these modes. This is an artefact of the data collection, however, since virtually all children report their journey *to* school when the survey day is a school day but only about 70% report their journey *from* school, and it seems likely that those ferried to and from school by car are less likely to return directly home from school, so that the purpose of the journey from school is reported under a different category. It would be possible to analyse the subset of children who reported both of their journeys to and from school, and this may show some asymmetry for children who are taken by car for one journey or the other, but not both. The analysis reported here is, however, restricted to the journey *to* school since, for the most part, the return journey will be similar.

Figure 3.1a Percentage walking to school

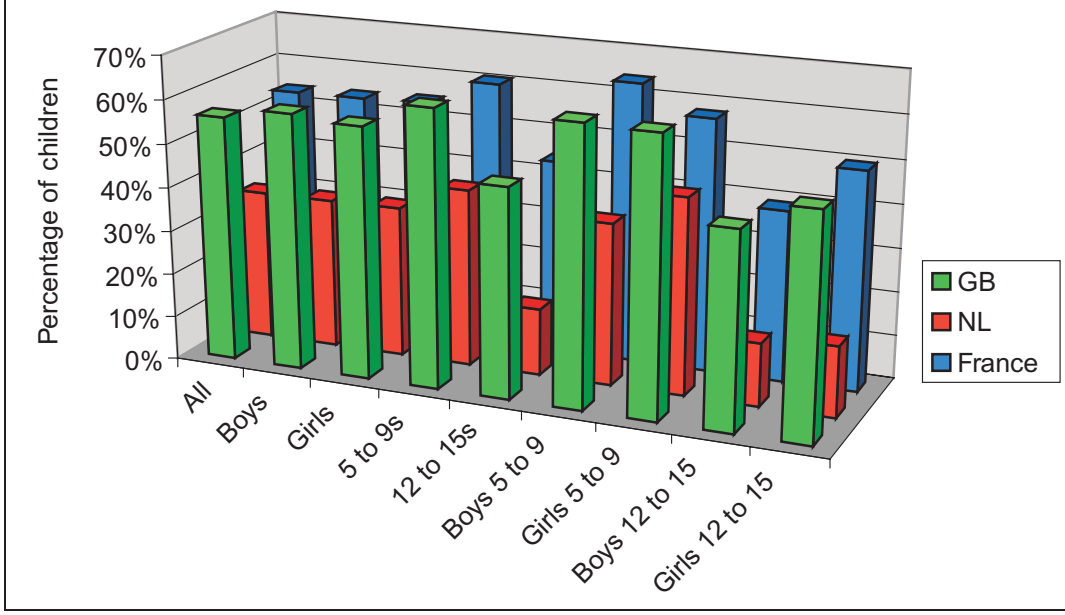
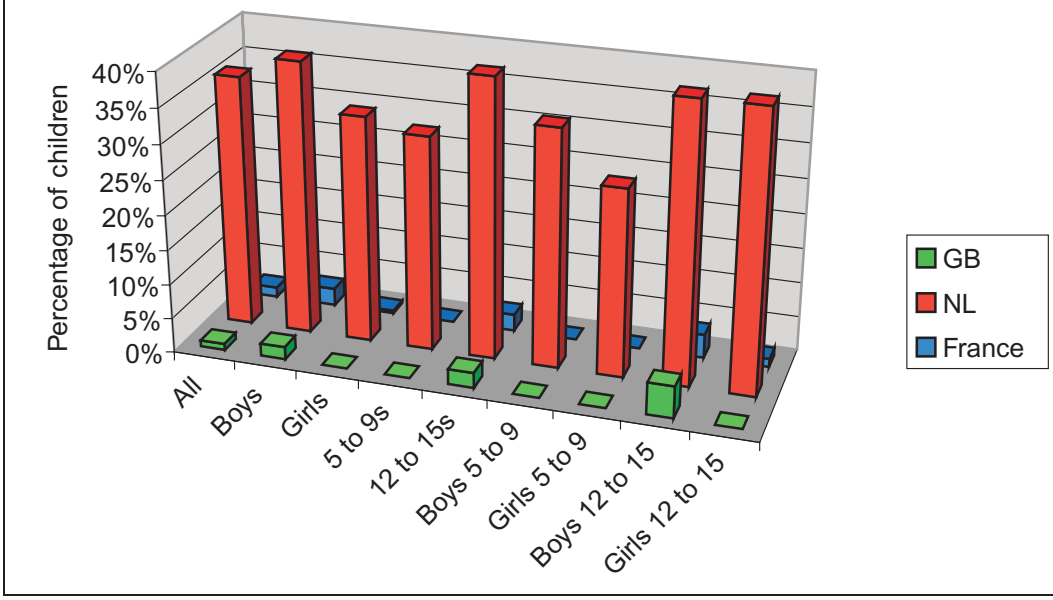


Figure 3.1b Percentage cycling to school

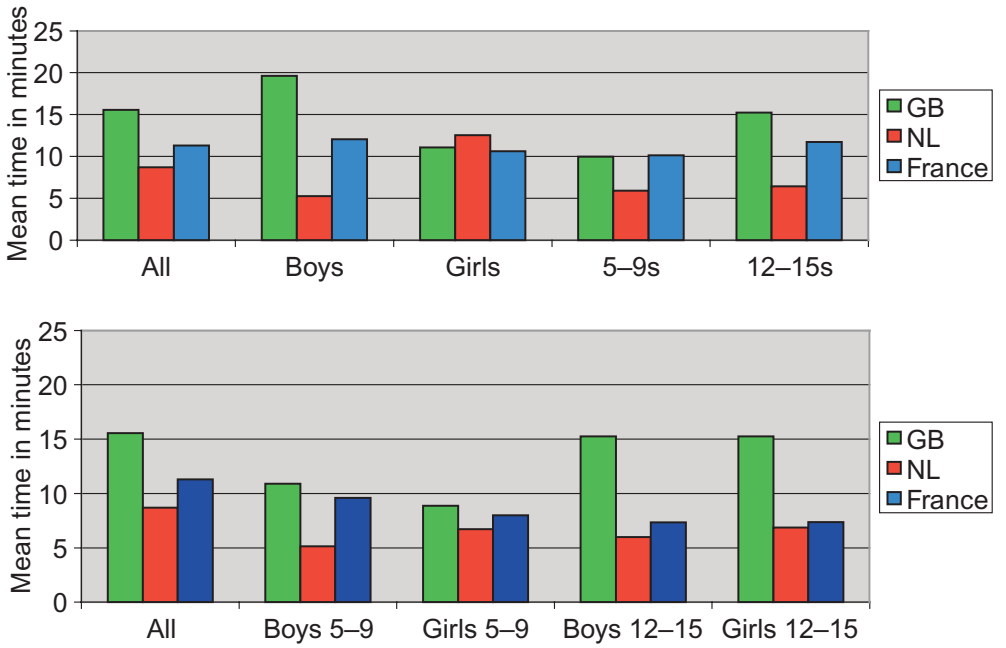


3.3 Journey times

3.3.1 Figure 3.2 shows the average journey time to school by each mode for those who made such a trip (a very small proportion of children used rollerblades to school but the sample sizes are too small for meaningful analysis, with mean exposures of 0.04 minutes in Britain, 0.01 in the Netherlands, and less than 0.01 in France). The mean walk times to school are significantly longer in Britain (at 15.6 minutes) than in France or the Netherlands (at 11.3 minutes and 8.7 minutes respectively). This may

be because the schools in the Netherlands are more closely integrated with the housing, perhaps reflecting greater residential densities. However, it is also the case that many more children cycle to school in the Netherlands, and the mean cycle journey time is 13.5 minutes, so that the combination of walk and cycle could well reflect mean distances to school which are similar to those in Britain and France. Cycle times are longer again in Britain (32 minutes) and France (18 minutes), but very few children cycle. The journey times in France are less than those in Britain for both walking and cycling, and the difference is on the edge of statistical significance, so schools may be slightly closer to homes in France. Interestingly, the standard deviation on the journey time (i.e. the width of the distribution) is much larger in Britain, at 60 minutes, than in the Netherlands (37 minutes), and especially than in France (9 minutes), suggesting that in France particularly children walk to the nearest school and there is little variation in distance (presumably for those children who travel further, they rarely walk).

Figure 3.2 Mean time per walking journey to school



3.4 Variation by age and gender

3.4.1 Figure 3.1 shows the percentages of children walking or cycling to school categorised by sex and age. Only the age ranges 5–9 and 12–15 are shown in order to make a clear distinction between younger and older children. For the most part, the sample sizes for children cycling are too small in Britain and France for detailed analysis, and in the further categorisations below only cycling in the Netherlands will be included. Overall, there are no substantial differences in the proportions of boys and girls walking to school in any country, though boys are significantly more

likely to cycle than girls in the Netherlands. However, there are significant differences in walk journey times (see Figure 3.2) between boys and girls in Britain (19.6 minutes for boys and 11.1 minutes for girls) and in the Netherlands (5.3 and 12.5 minutes for boys and girls respectively), though not in France (12.0 and 10.6 minutes respectively). Given that the proportions walking are so similar, these differences in time are difficult to understand, especially so since boys take longer in Britain and girls longer in the Netherlands. This is not necessarily a question of different distances to school, of course, it may simply be that children take longer to walk the same distance because they spend more or less time playing along the way. If they spend more time playing in the vicinity of roads, this may increase the accident risk.

3.4.2 As expected, differences between younger and older children are marked in all three countries. Younger children are much more likely to walk to school than older children, presumably because primary schools are smaller and, on average, closer to home, than secondary schools. In Britain and France, cycling is apparent only in the higher age groups, and in the Netherlands too cycling is more common than walking in the higher age group, whereas the reverse is true for younger children. For those who do walk, mean walking times are significantly less for younger children than for older children in Britain, with 10.0 and 15.3 minutes for 5–9 and 12–15-year-olds respectively, while in France, with 10.2 and 11.7 minutes respectively, and in the Netherlands with 5.9 and 6.4 minutes respectively, the differences are not statistically significant. Thus the distance to school is longer for the older children in Britain, as one would expect, and the difference may be underestimated by this if younger children walk more slowly – though since the younger ones will be taken by parents they may go more directly, but this does not seem to be the case in the other countries. In Britain, older girls and boys take much the same time, so it seems to be the younger boys who dawdle in comparison with girls.

3.4.3 For younger children in Britain and France, similar proportions of boys and girls walk to school, but for older children girls are significantly more likely to walk than boys, with some, but not all, of the difference made up by cycling. The situation in the Netherlands is complicated by the high incidence of cycling: for younger children about 70% of both boys and girls either walk or cycle, but roughly even numbers of boys walk and cycle, whereas girls are much less likely to cycle than walk. For older children, similar proportions (about 15%) of boys and girls walk, but 60% of boys cycle compared with 50% of girls. In Britain, older boys and girls are equally likely to use motorised transport, but in France and the Netherlands older boys seem more likely to use motorised modes than older girls.

3.5 Socio-economic group

3.5.1 Children were categorised by an assessed socio-economic grouping related to the different standard categorisations used in each country, with four categories in Britain (AB, C1, C2 and DE), three in France and five in the Netherlands. In Britain

and France there was a clear trend, with children from the lower socio-economic groups (SEGs) more likely to walk to school, as Figure 3.3 shows. This reflects the greater likelihood that children in higher SEGs will be ferried to school by car, both because car ownership is greater in the higher SEGs (and multiple car ownership may be especially relevant to this, since a single car may be used by the main worker with a start time very different from the school start time), and because the higher SEGs are more likely to live in low-density areas where distances to school are longer, on average, and they are also more likely to send their children to non-state schools which may need special transport arrangements. The latter are not necessarily by car, since many schools in more rural areas operate school bus collections over quite wide areas. In Britain, use of the car declines markedly across the groups, with about 35% of children from SEGs AB and C2 going to school by car, whether directly from home or after walking to a friend's, but this falls to 19% in group C2 and 12% for group DE.

Figure 3.3a Percentage walking and cycling by SEG – Great Britain

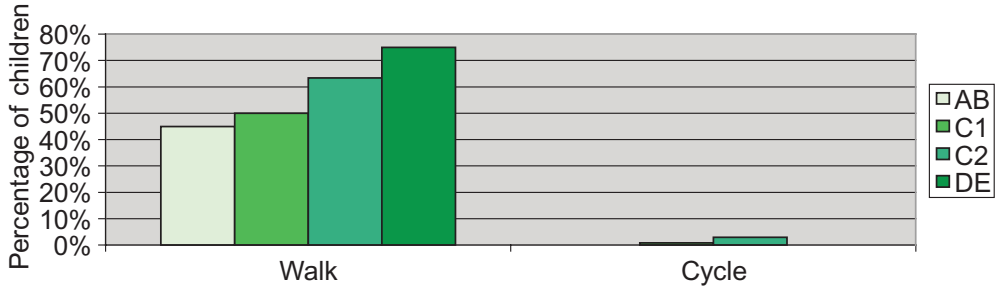


Figure 3.3b Percentage walking and cycling by SEG – the Netherlands

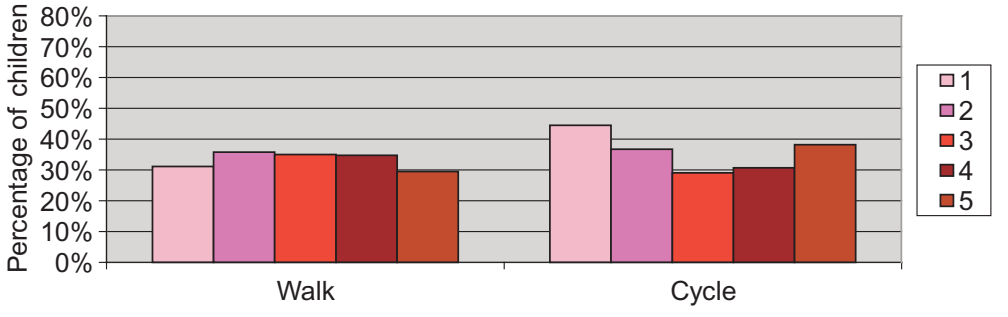
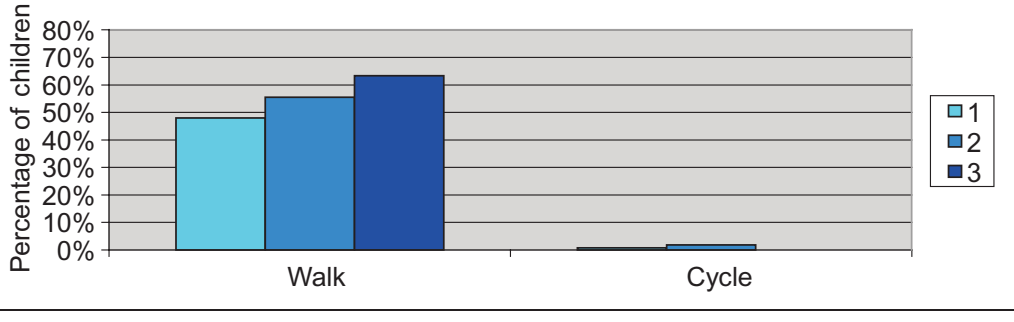


Figure 3.3c Percentage walking and cycling by SEG – France

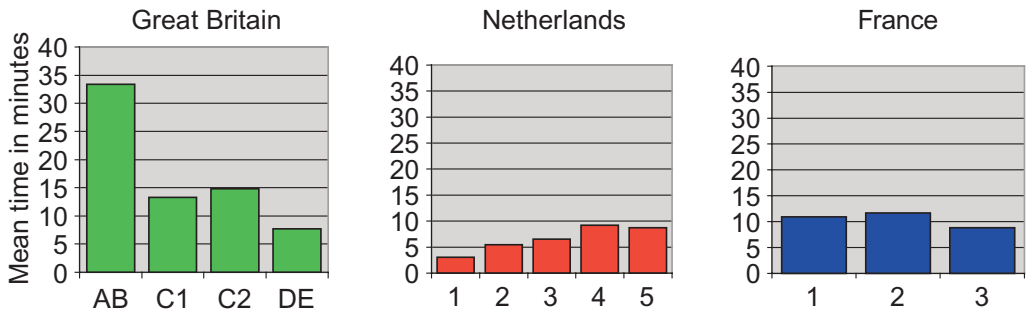


3.5.2 The use of different modes for journeys to school also varies by SEG:

- In Britain the use of public transport also falls from high to low SEGs: 20% of group AB use it, falling to 14% for group C1, and to 12% for both groups C2 and DE. This seems likely to reflect the need to use it, with the lower SEGs living closer to their school, than the ability to afford it, though it may also reflect the provision of school buses in lower density areas and for schools with wide catchment areas.
- The use of the car falls from high to low SEGs in France and the Netherlands, too, but conversely the use of public transport increases, in contrast to Britain.
- Cycling is not common in Britain and France, and sample sizes are too small for statistically valid results, but cycling also shows an increase down the SEG hierarchy, with the interesting exception of the lowest group, which shows no cycling at all in either country.
- The Netherlands shows no trend in either walking or cycling against SEG, with the exception of slightly less walking in the highest group. This suggests that the residential patterns of the different SEGs are more similar in the Netherlands than in Britain or France, in their geographical relationships to their schools; it does not necessarily imply that the different SEGs inhabit the same areas, of course. Cycling in the Netherlands shows more variation with SEG than does walking, with a general increase in use by the higher SEGs.

3.5.3 The pattern of *exposure* for those who do walk is substantially different from that of mode used, as Figure 3.4 shows. In Britain, although there is less likelihood of walking in the higher SEGs, for those children who do walk, the AB group has the highest mean pedestrian exposure time at 33.4 minutes, with groups C1 and C2 taking around 14 minutes, and group DE taking 7.7 minutes. Sample sizes in the different groups are sufficiently large for confidence in these patterns, and they probably reflect the lower density living of the higher SEGs. It says little about relative accident risk, since this depends not only on pedestrian exposure to roads but also on the risk of the type of roads the different groups experience. To the extent that the lower SEGs experience roads carrying higher traffic flows and roads in which the traffic is closer to the houses, the lower pedestrian exposure in the lowest group may not imply a lower total risk. Since routine accident statistics contain no information on SEG, this cannot easily be confirmed. In France, the pattern of mean exposure time is much more constant than in Britain, implying a modest increase in mean journey times from the lowest to the highest SEGs. In the Netherlands, by contrast, there is almost a trebling in mean walking time from 3.1 to 8.7 minutes for those who walk, from the highest to the lowest SEG. This compares with the finding above that very similar proportions of children walk in all groups. Thus children from the lower SEGs spend much more time getting to school, whether on foot or by cycle. It seems unlikely that the differences can be accounted for by differences in the time spent playing on the way to school, and suggests that

Figure 3.4 Mean time to school by SEG



in the Netherlands the lower SEGs live further from school than the higher SEGs, a surprising inversion compared with the other countries.

3.6 Ethnicity

3.6.1 The study made a very crude categorisation by ethnicity, with the interviewers judging the respondents simply as 'white' or 'non-white'. With sample sizes between 20 and 40 for non-whites, detailed analysis is inappropriate and little confidence can be attached to the differences, but they do reflect the general conclusions of previous studies that there is a high correlation between ethnicity and SEG. In all three countries, non-whites are more likely to walk to school than whites, and in the Netherlands they are much less likely to cycle (21% compared with 36% for whites), in line with the trend between lower and higher SEGs. It is also the case in Britain that non-whites have a much smaller mean walking time than whites for the school journey (5.7 versus 16.3 minutes), which is in line with the SEG trend. In France, by contrast, non-whites have a substantially longer, and statistically significant, walking time than whites (15.5 minutes compared with 10.8 minutes for whites).

3.7 Housing

3.7.1 The study distinguished between flats and houses, the age of housing and the distance of the house frontage from the road (closer or further than 3 metres). Overall, there are no consistent patterns between the three countries, and given the different housing traditions this is not surprising. It is clear that children in Britain and the Netherlands are much less likely to live in a flat than in France (15%, 6% and 60% respectively), and that the correlation between SEG and housing type (house or flat) is less marked in France than elsewhere. In Britain and France, children in pre-1920 houses or flats are more likely to walk to school than children in more recent housing, perhaps reflecting a preponderance of older housing in the higher-density inner-city areas; otherwise, the proportions walking are similar for housing built between 1920 and 1945, between 1945 and 1965, and post-1965. In the Netherlands, cycling is more prevalent, and walking less so, in the oldest and

most recent housing than in the 1920 to 1965 housing, a finding which cannot be interpreted without a more detailed knowledge of Dutch housing patterns. It is curious that, in Britain, the mean walking should be substantially higher for houses in the 1945–65 group, at 28.6 minutes, compared with 14.3, 11.4 and 11.6 minutes for pre-1920, 1920–45 and post-1965 housing respectively. Perhaps the extensive post-war housing estates are associated with substantially longer journeys to school, yet many such estates incorporated primary schools.

3.7.2 Disaggregation of housing according to the distance of its frontage from the road is likely to be correlated with SEG, with lower SEGs more likely to live in houses or flats close to roads. In Britain, however, children living in flats close to the road were less likely to walk to school than those in flats further from the road (47% compared with 70%), but the sample size of the former group is small. For children living in houses, as expected, those closer to the road are more likely to walk to school, and the same is true of France, though not of the Netherlands where, in any case, there was less variation of children's travel behaviour with SEG. However, it is also the case that British children in houses closer to the road have a substantially larger walking time of 21.8 minutes compared with 12.6 minutes for those in houses further from the road. Thus where children are more likely to walk, and where they are more likely to be in lower SEGs, the journey time is longer. It may be that, for older children at least, the distance to school for many is quite long, but insufficiently long for a school bus or free travel concessions.

3.8 The type of area

3.8.1 In Britain, the likelihood of walking to school does not vary depending on the type of area (city, town or rural), with around 58% walking to school, however the time spent walking does vary, with those in rural areas having the longest walk times (22.2 minutes compared with 12.7 minutes in cities and 12.1 minutes in towns). In France, those that live in the cities are much more likely to walk to school (69%), while only 39% of those that live in rural areas walk all the way to school. Those that live in rural areas are more likely to cycle to school (3.5%) but tend to walk in combination with cars (21%) and buses (18%). There is less variation in walk times in France, those in rural areas still walk for the longest (12.2 minutes) but that time is not much longer than in cities (11.5 minutes) or towns (9.7 minutes).

3.9 Accompaniment

3.9.1 Figure 3.5 shows whether the child was accompanied on the journey to school and, if so, whether the accompanying person was an 'adult' (identified as over 16 here in order to distinguish from friends). There are substantial and significant differences between the countries in accompaniment, in that, overall, children in Britain are more likely to travel alone than in either France or the Netherlands (30% compared with 39% and 42% respectively) and, when children are accompanied, they are equally likely to be accompanied by an adult or friends in the Netherlands but are

more likely to be accompanied by an adult in Britain or France. Although the study of accident risk could say nothing about the dependence of risk on accompaniment, since accident records did not note accompaniment, it is likely to be important since the presence of an adult is likely to restrain dangerous behaviour, while the presence of friends may divert attention from the presence of traffic.

3.9.2 Girls are more likely to be accompanied by an adult than boys, and girls are less likely to walk alone, in all three countries, but the differences are relatively small (a few percentage points in Britain and France, around 10% in the Netherlands). As one would expect, the younger age group is very much more likely to be accompanied by an adult than the older age group, by approximately 70% to 6% in both Britain and France, though the effect is less marked in the Netherlands (49% to 28%), where the proclivity of older children to be accompanied by an adult is remarkably high. Younger children are less likely to walk to school alone in Britain (16%) than in either France (23%) or the Netherlands (31%), and although they are no more likely to be accompanied by friends in Britain (17%) than in France (16%), 34% of younger children in the Netherlands travel to school with friends. Other things being equal, this might be expected to increase the safety of children in Britain relative to the other countries. Younger girls are more likely to be accompanied by an adult than younger boys in both Britain (80% versus 73%) and France (80% versus 59%), but not in the Netherlands where the proportion is about 50% for both sexes. Here, as in much of this analysis, the behaviour in Britain and France is similar, while that in the Netherlands is substantially different.

3.9.3 Children from different SEGs in Britain are equally likely to travel alone, but in the lower SEGs substantially larger proportions of children are likely to be accompanied by an adult (43% in AB, 48% in C1, 59% in C2 and 74% in DE). Since the different groups have similar proportions of children travelling with friends, this suggests that in the lower SEGs children are more likely to travel in a group containing both adults and friends (or siblings), since the categories of travel with friends and with adults are not mutually exclusive. In France, by contrast, children in the lowest SEG are twice as likely to travel alone as in the higher groups, and they are much less likely to travel with an adult. In the Netherlands, children are less likely to travel alone, are more likely to travel with friends, and are equally likely to travel with an adult, as they come from higher SEGs.

Figure 3.5a Accompaniment by country

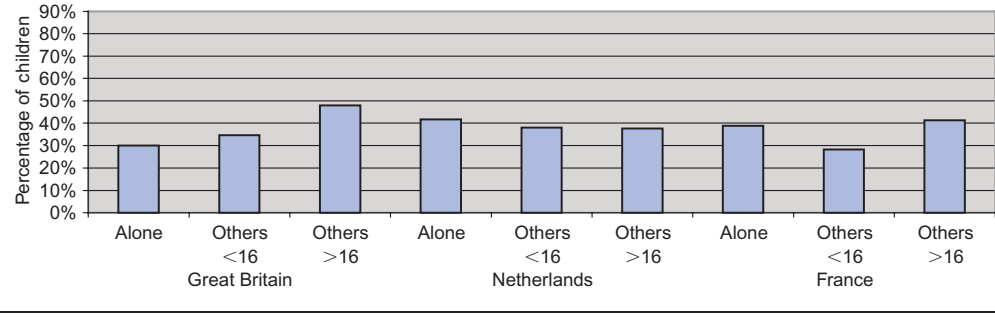


Figure 3.5b Accompaniment by gender

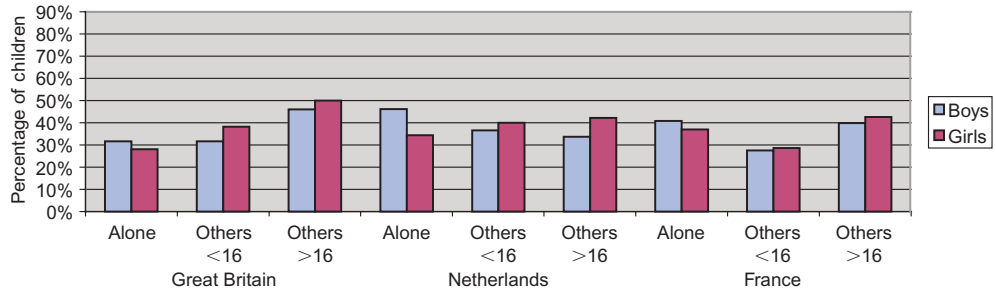


Figure 3.5c Accompaniment by age group

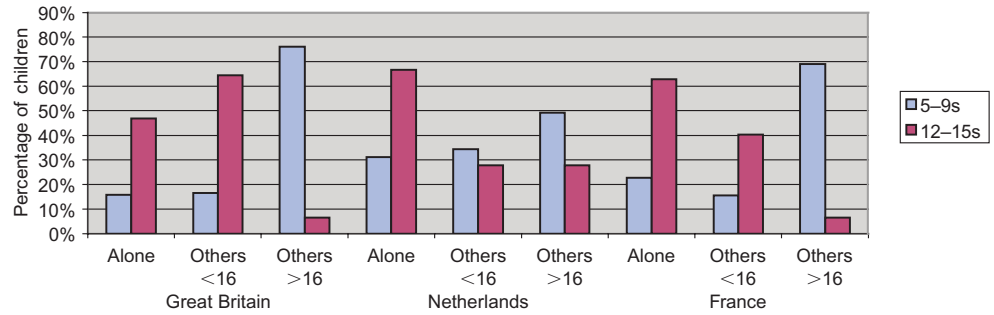


Figure 3.5d Accompaniment by gender for 5–9s

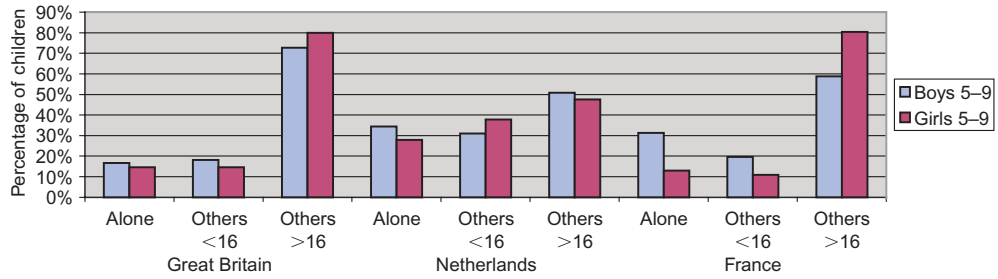
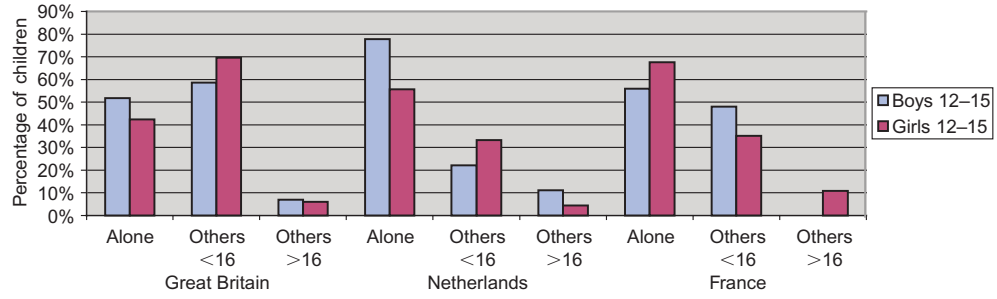


Figure 3.5e Accompaniment by gender 12–15s



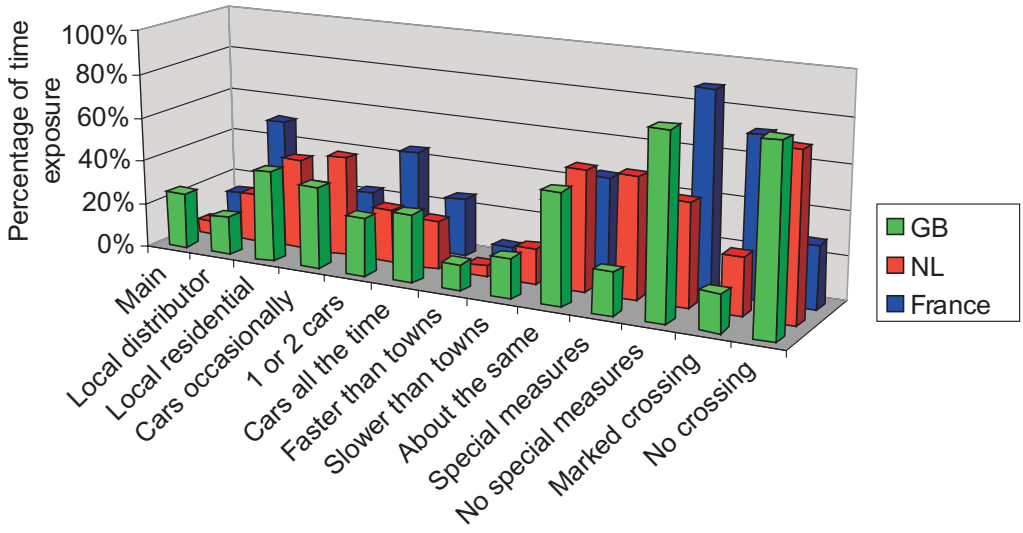
3.9.4 There is no clear pattern of differences across the categories of housing, except that in France children are more likely to be accompanied by an adult and they are less likely to be accompanied by friends, as they come from older housing, which may reflect the effect of older inner-city housing requiring better accompaniment because of high traffic levels. There is a curious discrepancy between children living in flats less than 3 metres from the road in France, who are more likely to be accompanied by an adult than those from flats with a frontage further from the road, and those from houses less than 3 metres from the road, who are less likely to be accompanied than those from houses further from the road. The reverse is true of flat dwellers in Britain, but here the sample is small. Overall, the effect of housing type is confounded by SEG effects, and no helpful conclusions can be drawn.

3.9.5 In Britain, those that live in cities are the most likely to be accompanied by an adult when walking to school (57%). A third of those that live in towns are unaccompanied for their walk to school, compared with only 25% of those in cities. Those that live in rural areas are more likely to walk to school with other children (40%). Similarly in France, it is those that live in cities that are the most likely to be accompanied by adults (48%), although a higher proportion of city dwellers (33%) are unaccompanied. High proportions of children that live in towns (47%) and in rural areas (41%) walk to school unaccompanied, but as in Britain it is those that live in rural areas that are the most likely to walk to school with other children (37%).

3.10 The road environment

3.10.1 The variation in exposure time to different types of road environment is very similar to that for all journey purposes, in that the proportion of the time spent in the vicinity of main through-roads is significantly greater in Britain, at 25%, than in France (14%) and is very much greater than in the Netherlands (6%) (see Figure 3.6). This comparison is slightly biased by the higher incidence in the Netherlands of responses where no information is given, and France shows a surprisingly high incidence of ‘local distributor’ roads as compared with ‘local residential’, but the differences are clear. Overall, children on their way to school in Britain walk along larger, more heavily trafficked roads (31% of the roads used in Britain have traffic passing ‘all the time’, compared with 26% in France and 22% in the Netherlands) and along roads with faster traffic (12% of the roads used in Britain carry traffic that is judged to be ‘faster than most traffic in towns’, compared with 7% in France and 5% in the Netherlands, while in France 32% of the roads used have speed limits lower than the standard urban limit of 50 kph and in the Netherlands 15% have lower limits, compared with only 6% lower than 30 mph in Britain) than children in France or the Netherlands. These aspects are summarised in Figure 3.6.

Figure 3.6 Percentage of time exposure by road type, traffic volume and speed, measures to slow traffic and crossing place



3.10.2 For journeys to school, the most remarkable difference is in the presence of special measures (other than speed limits) to slow traffic down. This is more common in Britain, at 19% of exposure, than in France, at 11%, but in the Netherlands 54% of exposure was in the presence of special measures. The special measures are not all formal traffic calming schemes (they include speed cameras, for example), but nevertheless 27% of time exposure overall in the Netherlands is in the presence of 'road humps', 5% near 'artificial curves', 8% near pinchpoints or islands and 4% with special road surfaces. This chimes with the general perception that specially protected residential 'Woonerfs' are widely provided in the Netherlands, though it is interesting that this is not fully reflected in lower speed limits: as noted above, 15% of exposure in the Netherlands is within speed limits that are lower than 50 kph (13% at 30 kph and 2% at 40 kph), but France has a much larger percentage at 32% and at lower limits (9% at 20 kph, 13% at 30 kph and 10% at 40 kph). It should be noted that although the Dutch Government's intention was that all residential roads would be converted to 30 kph zones with associated traffic calming, by 1997 calmed 30 kph zones and 'Woonerfs' accounted for only 8500 of the 55,000 km of urban roads (15%). This was expected to be 37% by 2001. The protected designs of the road environment may well account for the much higher percentage of the journey to school in the Netherlands which takes place 'on the road' (12%) as opposed to 'on the pavement' (70%), or 'neither pavement nor road' (16%), compared with Britain (3%, 93% and 3% respectively) or France (7%, 89% and 2%).

3.10.3 The journey to school in the Netherlands is less likely to be in the presence of parked cars (23% of exposure time had parked cars 'all along the road' while 35% had 'no parked cars at all'), but parked cars were slightly more prevalent in France

(31% and 28% respectively) than in Britain (28% and 31%). Overall, these differences are modest and are not statistically significant.

3.10.4 As for walking in general, children walking to school in Britain or the Netherlands were much more likely to cross the road at an unmarked place (83% in Britain, 74% in the Netherlands) than were children in France (28%).

3.11 Conclusions

3.11.1 Overall, the main points to be drawn from the analysis of the journey to school are as follows:

- Over half of children ***walk*** to school in Britain and France, compared with a third in the Netherlands. However, there is very little use of ***cycling*** to get to school in either Britain or France, whereas in the Netherlands as many children cycle as walk. In Britain and France almost half of the children travel to school by ***motorised modes***, while less than a third do so in the Netherlands.
- ***Walk times*** to school are shorter in the Netherlands than in Britain or France, but this may be because the longer journeys are made by cycle rather than because average distances are shorter.
- There are no significant differences in the proportions of ***boys and girls*** walking to school in any of the countries, though boys in the Netherlands are much more likely than girls to cycle. In Britain, boys take much longer to walk to school than girls.
- As expected, ***younger children*** are more likely to walk to school than ***older children.*** In Britain, their mean walking times are much shorter than those of older children (in ratios of 0.5 to 0.7). In Britain and France, older girls are more likely to walk than older boys, but the difference is partly made up by the boys' cycling. In the Netherlands, older children are much more likely to cycle than walk, while the reverse is true of younger children. In Britain, older boys and girls are equally likely to use motorised transport, but in France and the Netherlands older boys seem more likely to use motorised modes than older girls.
- In both Britain and France, children from lower ***SEGs*** are more likely to walk to school than children from higher SEGs, whereas in the Netherlands there is no trend with SEG. However, for those who walk the mean journey time increases with SEG in Britain, is fairly constant in France, and decreases with increasing SEG in the Netherlands. Thus the spatial distribution of the SEGs is likely to be very different in the three countries.
- The effect of ***ethnicity*** is probably strongly correlated with that of SEG, with non-white children showing similar travel patterns to those of the lower SEGs.

- No very clear picture emerges from an analysis of ***housing types***, and these are in any case likely to be strongly correlated with the effects of SEG. British children living in houses with a frontage close to a road are more likely to walk to school.
- In Britain there are no significant differences between the proportion of children that walk to school in the different ***types of area*****,** but those living in rural areas have the longest walk times. In France, those living in the cities are much more likely to walk to school, but the walk times are similar in each type of area.
- Children in Britain are less likely to be ***accompanied*** on the journey to school by either adults or friends than is the case in France and the Netherlands, but if they are accompanied it is more likely to be by an adult than is the case in either France or the Netherlands. As expected, younger children are much more likely to be accompanied by an adult than older children, and girls slightly more so than boys. In Britain, children from lower SEGs are more likely to be accompanied by an adult (and by friends) than those from higher SEGs, whereas in France accompaniment by an adult is less likely in the lower SEGs, and in the Netherlands there is little difference.
- Children in Britain are significantly more likely than children in the other countries to walk to school along more ***major through-roads***, with higher traffic volumes and faster traffic, and they are less likely to be subject to speed limits lower than the standard urban limit. Differences in the presence of parked cars are modest. The most striking difference is that ***special measures to reduce speeds*** in the Netherlands (generally some form of traffic calming) are present for over half of the journeys to school, compared with less than a fifth in Britain.
- Children walking to school in Britain or the Netherlands were much more likely to ***cross the road*** at an unmarked place than were children in France, but no data on the overall provision of marked crossings are available.

4 Journeys to/from visiting friends

4.1 Introduction

4.1.1 Apart from the school journey, much of the other pedestrian activity of children is associated with playing, either alone or with friends. Often, the playing with friends may be at a friend's home, and the children will generally get there by walking or cycling. This chapter is concerned with pedestrian journeys (mostly) to visit friends, while Chapter 5 considers the children's exposure when playing in the road environment. The two activities may not be distinct, of course, since children may call on friends and then go on to play outside: it is the children's own categorisation, as elicited by the interviewers, which is used here.

4.2 Variation by age and gender

4.2.1 Figure 4.1 shows that, overall, about a quarter of children in Britain and the Netherlands (23 and 24% respectively) reported visiting friends, compared with significantly fewer (16%) in France. However, in the Netherlands a further 14% cycled to visit friends, whereas only 1.8% and 1.3% respectively cycled in Britain and France. Thus it seems that there may be significant cultural differences between the countries in the tendency to visit friends: this might be to some extent a difference in identification with the rather formal notion of 'visiting' friends, but the reporting of 'playing' or 'hanging around' does not suggest any compensation between the categories. In both Britain and the Netherlands, girls are more likely to visit friends than boys, while in France they are equally likely. By contrast, in Britain and France older children are more likely to visit friends than younger children, while there is little difference (with younger children slightly more likely to visit friends than older children) in the Netherlands. Younger children spend less time walking than older children, as might be expected, but in Britain the times are surprisingly similar (10.0 minutes for 5–9-year-olds, compared with 11.5 minutes for 12–15-year-olds). There is generally little difference in mean walking times between the sexes: (Figure 4.2) older girls in the Netherlands spend less time walking (9.5 minutes) than older boys (11.9 minutes), but this difference is not statistically significant. Thus the differences between the countries are complex, as outlined below.

The Netherlands

- Thirty-nine per cent of children visit friends either on foot or cycling, with girls more likely to visit friends than boys.

Britain

- A quarter (25.2%) of children visit friends, with girls more likely to visit friends than boys, and older children more likely than younger children.

France

- Only 17% of children visit friends, with girls and boys having similar levels, but with older children more likely to visit friends than younger children.

Figure 4.1a Percentage walking to visit friends

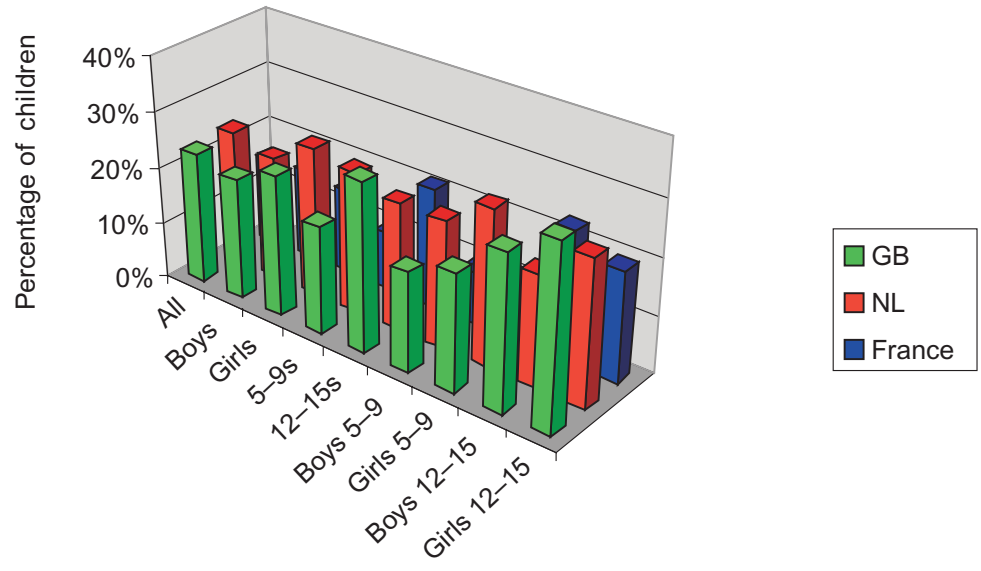


Figure 4.1b Percentage cycling to visit friends

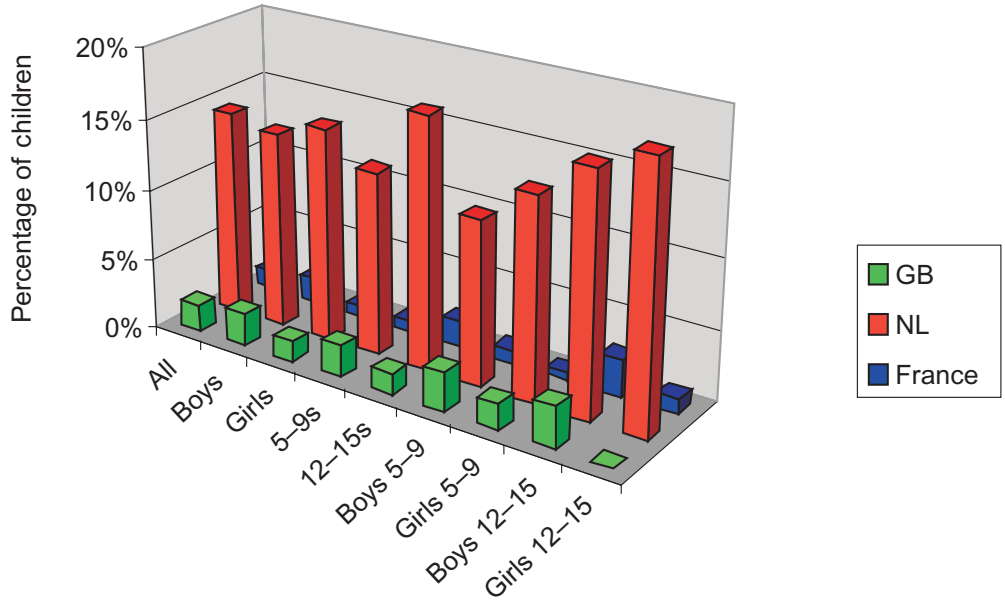
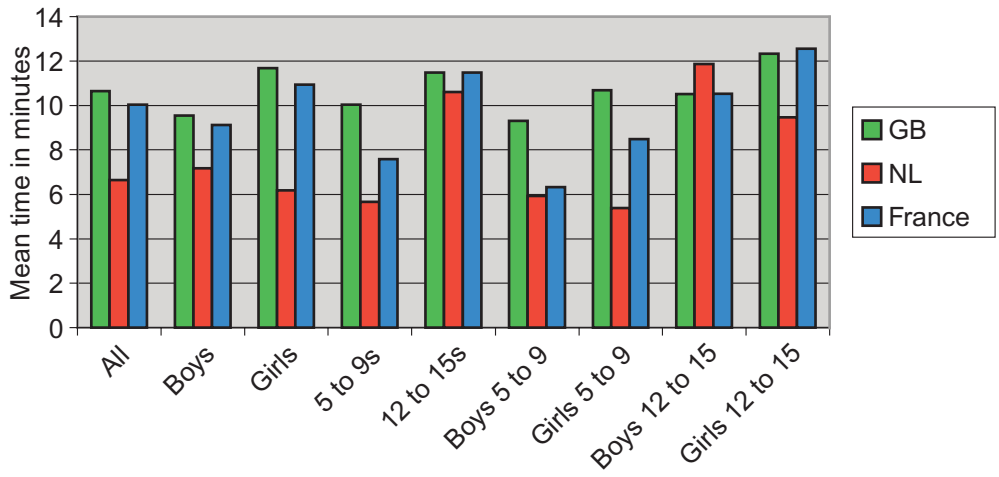


Figure 4.2 Mean walking time – visiting friends



4.3 Socio-economic group

4.3.1 There is a general increase in the likelihood of visiting friends from the higher to the lower socio-economic groups (SEGs) in Britain, but it is not consistent in that while the percentage of children visiting increases from 18 to 27 from group AB to C2, it is lower again, at 22%, for group DE. The increase from group AB through C1 to C2 is likely to be due to a declining use of the car to take the children to visit friends, but the lower percentage in group DE may be because there is less tendency on the part of this group to undertake any formal 'visiting' of friends, as illustrated by a greater tendency in this group to be 'playing or hanging about' in the road environment — perhaps children are less likely to play in their friends' homes and are more likely to play outside. By contrast, there is no marked variation across the SEGs in either France or the Netherlands: variation across the groups is especially small in the Netherlands, as we have also seen for the school journey.

4.3.2 Mean walking times for those who walk are substantially longer for the lower SEGs in the Netherlands compared with the higher groups (9.9 to 3.1 minutes from lowest to highest), while the converse is true in France (5.1 to 12.8 minutes), and in Britain there is no significant nor consistent variation across the groups.

4.4 Ethnicity

4.4.1 In both Britain and France, non-white children are less likely to have walked to visit friends than white children (16% versus 24% in Britain; 13% versus 16% in France), whereas in the Netherlands the difference is only 1%. However, in both France and the Netherlands non-white children are more likely than white children to cycle (2.6% versus 0.2% in France; 18% versus 14% in the Netherlands), so in combination the percentage using walk or cycle is the same for both ethnic groups. In Britain, by contrast, non-white children are less likely to cycle (0% versus 2.0%),

widening the difference and making it more significant. Non-white children in the three countries tend to come from different cultures, and it may be that family size, as well as the availability of extended families, affects the need to visit friends.

4.4.2 Mean walking times for non-whites are similar to those in the lower SEGs in France and the Netherlands, i.e. much longer than the average for whites in the Netherlands, and are much shorter in France. In Britain, despite the lack of a consistent trend with SEG, non-whites' walking times are only about half those of whites, perhaps reflecting a different social behaviour or family composition.

4.5 Housing

4.5.1 In general, the analysis by SEG suggests that there may be smaller differences between the residential patterns of different social groups, in relation to the urban geography, in the Netherlands and France than in Britain. Nevertheless, there is relatively little variation in the percentages of children visiting friends across the different categories of housing, and the differences are not significant, except that in Britain and the Netherlands children living in apartments are less likely to visit friends than those in houses. In France the situation is markedly different: children in apartments are more, rather than less, likely to visit than children in houses (but France has a greater tradition of apartment living), but the strongest difference is that visiting is much less likely where the home, whether apartment or house, has a frontage less than 3 metres from the road. This effect is not found in the other countries, nor in France for the journey to school (Chapter 3) or in playing or hanging around (Chapter 5), and nor is there a strong effect of the SEG in France so it cannot be attributed to poorer families being more likely to live close to a road.

4.6 The type of area

4.6.1 In both Britain and France, those that live in rural areas are slightly more likely to visit friends, although the differences are not statistically significant. A quarter of those that live in rural areas in Britain visited friends compared with 22% of both town and city dwellers. While in France, 17% of those that live in rural areas visited friends compared with 15% of town dwellers and 14% of city dwellers. Walk times to visit friends do not vary greatly between the area type, although in Britain the walk time for those that live in rural areas is slightly shorter at 9.4 minutes (compared with 10.1 minutes in towns and 13.2 minutes in cities). In France, the walk times for those that live in rural areas is slightly longer at 10.2 minutes (compared with 10.1 minutes in cities and 9.5 minutes in towns).

4.7 Accompaniment

4.7.1 Figure 4.3 shows that when visiting friends, as in other activities, children in the Netherlands are less likely to be accompanied by an adult (or, at least, someone of 16 or over) than in the other countries, while children in Britain are more likely to

be accompanied by other children. This latter difference between Britain (33%) and the Netherlands (27%) is not statistically significant, but that between Britain and France (23%) is significant. In general, the variation in accompaniment by sex and age is what would be expected: younger children are less likely to be alone and are more likely to be accompanied by adults than older children, and girls are more likely to be accompanied than boys. The sizes of the differences tend to be similar in Britain and France, but they are smaller in the Netherlands. For example, the biggest difference between the groups is generally between the youngest girls and the oldest boys. In Britain, 23% of the 5–9-year-old girls are alone, compared with 84% of 12–15-year-old boys. In France these figures are 23% and 76% respectively, but in the Netherlands they are 63% and 100%, though unfortunately this latter figure results from a small sample of only 18, about half the size of the other cells in this multi-way split. Nevertheless, the other results from the Netherlands' survey are commensurate with it. This lack of adult supervision in the road environment might be expected, other things being equal, to increase the risk of accident, but as we have seen in the original comparative study (Bly *et al*. 1999) there are other reasons why Dutch children have an absolutely lower accident risk.

4.7.2 The variation in accompaniment categorised in other ways shows little of interest. There is little systematic variation with SEG, and differences are slight and insignificant, except that in France there is a strong increase in adult accompaniment from the highest to lowest groups: the proportion of children accompanied by someone over 16 increases from 21% in the highest group through to 28% in the middle group and to 40% in the lowest group. It is also the case that non-white children in France are more likely to be accompanied by someone aged over 16 than white children (33% versus 26%), but the difference is not significant given the small sample size, and the same is true of the smaller proportion of non-white children in Britain (13%) accompanied by an older person, compared with 22% for white children.

4.7.3 There is also little variation in accompaniment when walking to visit friends by area type. In Britain, those living in rural areas were the most likely to be accompanied by adults (31%), while those in the towns were more likely to be alone (68%) or with other children (39%).

Figure 4.3a Accompaniment by country

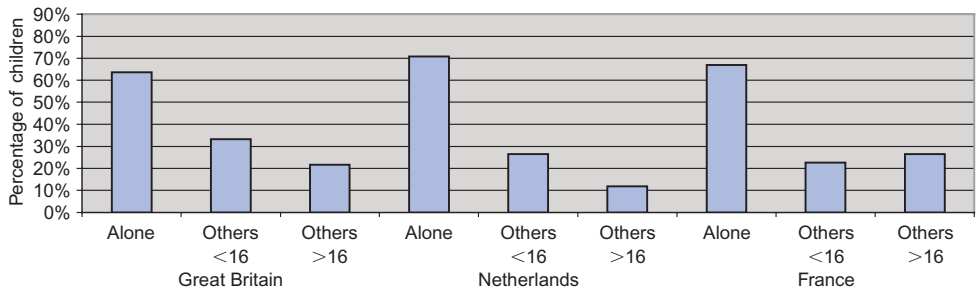


Figure 4.3b Accompaniment by gender

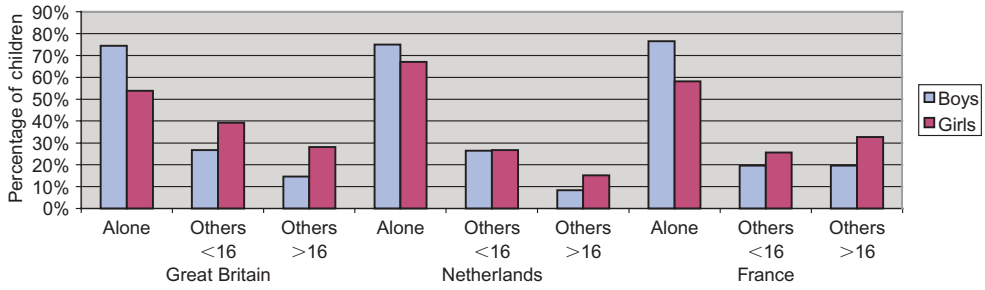


Figure 4.3c Accompaniment by age group

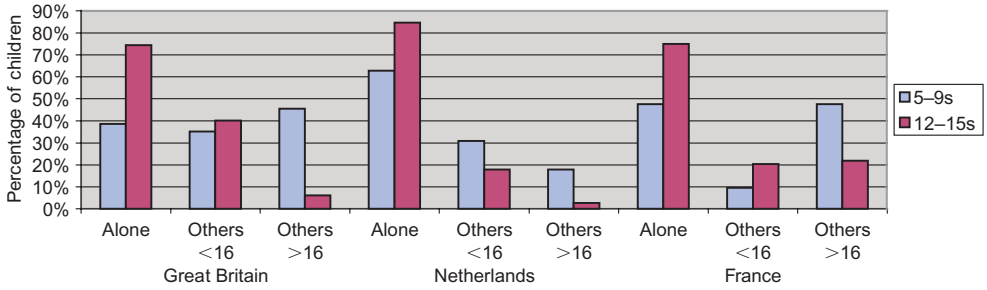


Figure 4.3d Accompaniment by gender for 5–9s

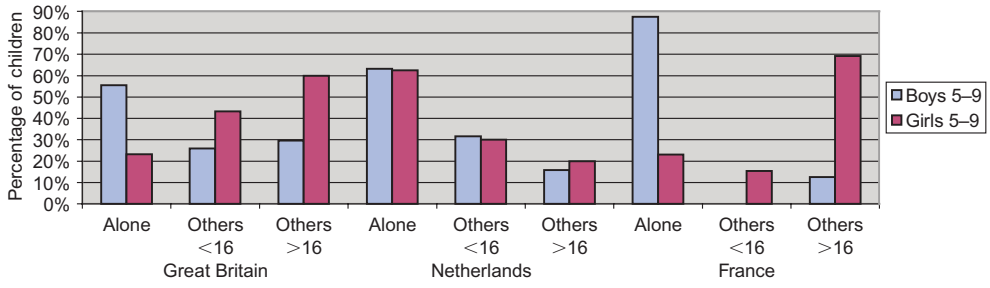
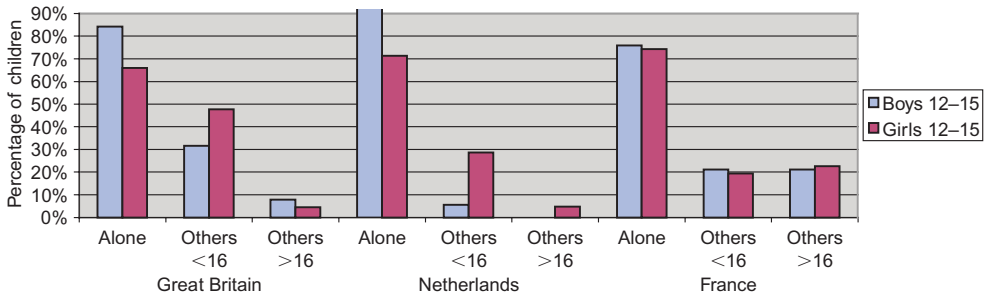


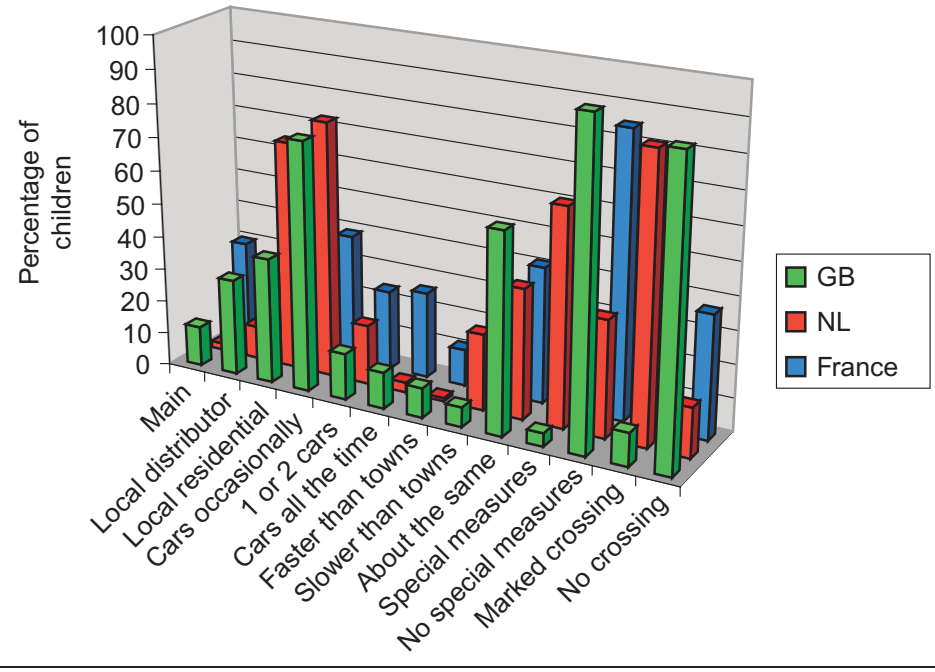
Figure 4.3e Accompaniment by gender for 12–15s



4.8 The road environment

4.8.1 The activity of visiting friends seems to be a more local one than walking in general for British children, since some of the overall distinctions between the countries in terms of the size and busyness of roads walked along or crossed disappears in this activity, as Figure 4.4 shows. Main through-roads account for 12% of traffic exposure in Britain, compared with only 2% in the Netherlands, but now French children spend much more time near larger roads, at 30%. The level of walking activity on local distributor roads in France has also diminished, to 18%, while that in Britain has increased to 29%, though as one might expect residential roads accommodate most of this activity, most markedly in the Netherlands (38% Britain, 32% France, 69% Netherlands). This different distribution of road environments is reflected in the volume of traffic, with cars passing 'all the time' for 26% of the exposure time in France, but only for 11% in Britain and 3% in the Netherlands, suggesting a very protected local environment there. However, both France and the Netherlands still show the effect of speed limits which are lower than the standard urban limit: this accounts for 23% of exposure in France and 21% of exposure in the Netherlands, compared with only 7% in Britain. Consistently with this, 33% of passing traffic was judged to be travelling 'slower than most traffic in towns' in France and 23% of traffic in the Netherlands, compared with only 6% in Britain, though 11% of traffic in France was judged to be 'faster than most traffic in towns' compared with 9% in Britain. Conversely, there were more parked cars in both France (28%) and the Netherlands (45%) than in Britain (14%), which might be expected to increase risks in the other countries, but this very much depends on where the cars are parked and what sort of traffic runs alongside them. In any case,

Figure 4.4 Percentage time exposure by road type, traffic volume and speed, measures to slow traffic and crossing place



the situation is reversed when it comes to crossing the road. Parked cars were judged to obscure the view at 31% of crossings in Britain, compared with only 12% in the Netherlands and 7% in France. This should be treated with caution, since judgements about parked cars were made by the interviewers when they rewalked the route and not necessarily at the same time of day as the original journey, but the finding could merit further investigation.

4.8.2 The incidence of 'special measures to slow traffic' in the Netherlands is even higher for this activity than overall: 65% of exposure was in the presence of special measures, compared with 15% in France and only 4% in Britain, the latter a substantially lower incidence than for walking in general. For this activity, however, as opposed to walking in general, this higher incidence of protection in the Netherlands is not linked to a greater likelihood of walking in the road, or on both the pavement and the road, which accounts for 20% of the exposure in France, but only 13% in the Netherlands and 3% in Britain. A remarkable 48% of British children said that they were 'walking faster than normal' when going to visit friends, compared with 17% in France and 18% in the Netherlands. This compares with 15% walking quickly in Britain on the way to school (and 25% and 12% respectively in France and the Netherlands): in Britain, but not in France, it seems that visiting friends requires more purposeful walking than going to school!

4.8.3 Lastly, British children are more likely to cross the road at an unmarked place when visiting friends than they do overall, at 90% of crossings, compared with 37% in France and 15% in the Netherlands. However, it is not clear whether this is by choice or because there are no marked crossings available. This last finding is curious, since overall and on the way to school Dutch children are almost as likely to use an unmarked crossing as British children.

4.9 Conclusions

4.9.1 Overall, the main points to be drawn from the analysis of journeys to visit friends are as follows:

- A quarter of British children ***walked or cycled*** to visit friends on the survey day, compared with 38% of Dutch children and only 17% of French children.
- British and French children spend more ***time*** walking to visit friends (10 minutes) than Dutch children (7 minutes).
- In Britain and the Netherlands, ***girls*** are more likely to visit friends than ***boys***, but there is little difference in France.
- In Britain and France, ***older children*** are more likely to visit friends than ***younger children***, but there is little difference in the Netherlands.

- There is little variation in behaviour with ***SEG*** in France and the Netherlands, and although there is more variation in Britain it is complex: walking to visit friends is less likely in the highest and lowest SEGs than in the middle groups.
- There is little difference between ***non-white*** and white children overall in France and the Netherlands, but in Britain non-white children are less likely to walk or cycle to visit friends and, when they do, their journeys are shorter.
- Children living in ***apartments*** in Britain and the Netherlands are less likely to walk to visit friends than those in ***houses***, while in France those living in apartments or houses with frontages close to the road are less likely to visit than those in apartments or houses further from the road.
- Children living in ***rural areas*** are more likely walk to visit friends in both Britain and France.
- Children in the Netherlands are less likely to be ***accompanied*** by someone of 16 or over than in the other countries, while children in Britain are more likely to be accompanied by other children.
- The exposure of British children to ***major roads*** and busy roads when visiting friends is much less than it is for overall pedestrian activity, and is much more similar to that in the other countries. However, the greater likelihood of being in the presence of ***low speed limits*** in the other countries persists, while 65% of the activity is in the presence of ***special measures*** to slow speeds in the Netherlands.
- ***Parked cars*** were judged to obscure the view at 31% of crossings in Britain, compared with only 12% in the Netherlands and 7% in France.
- British children show are even more likely to ***cross the road*** at an unmarked place when visiting friends than they do overall, at 90% of crossings, compared with 37% in France and 15% in the Netherlands. Although it should be noted that the level of provision of marked crossings in each country is not known.

5 Playing/hanging about on the streets

5.1 Introduction

5.1.1 The last category of exposure to be examined in this study is the less specific one of 'playing' or 'hanging around' in the road environment. It does not involve any specific journey and it may include more or less walking as opposed to staying in one place, but it involves the child's presence close to roads and the nature of the play itself may reduce a child's awareness of traffic dangers, so it is very pertinent to the consideration of child pedestrian safety. Although the children themselves may distinguish between 'playing' and 'hanging around', especially as they grow older, for the purposes of this analysis the general activity will be referred to as 'playing'.

5.2 Overall exposure

5.2.1 There is a very marked difference between Britain and France, on the one hand, and the Netherlands, on the other, in this category, as Figure 5.1 shows. Whereas only 17% of children in Britain and 14% of children in France report playing or hanging about, 37% of children in the Netherlands engaged in this amorphous activity. Moreover, although there is rather more cycling associated with it in Britain and France than with other activities (3.2% and 3.4% respectively), it adds a further 8% in the Netherlands (though this is less than for other activities – cycling is a mode of transport in the Netherlands whereas it is more likely to be playing in the other countries) and this widens the gap still more. Rollerblading is too little used for analysis and has been omitted altogether in the discussion of other activities, but it is worth noting here that rollerblading is reported by 3.5% of Dutch children when playing, compared with 0.8% and 1.5% in Britain and France. Thus it is clear that Dutch children are much more likely to spend time near roads playing than children in either Britain or France. Of the children who report playing, however, the French children spent a much longer time in the activity: the mean time per session of play[3] was 48 minutes in France, compared with 27 minutes in Britain and 28 minutes in the Netherlands (see Figure 5.2). Thus the overall exposure level (per session of play) in France is about 7 minutes, compared with 10 minutes in the Netherlands and 5 minutes in Britain.

[3] Where children recorded more than one session of play, separated by some other activity, the two were counted separately and the times given here are the averages per session.

Figure 5.1a Percentage that are walking during play

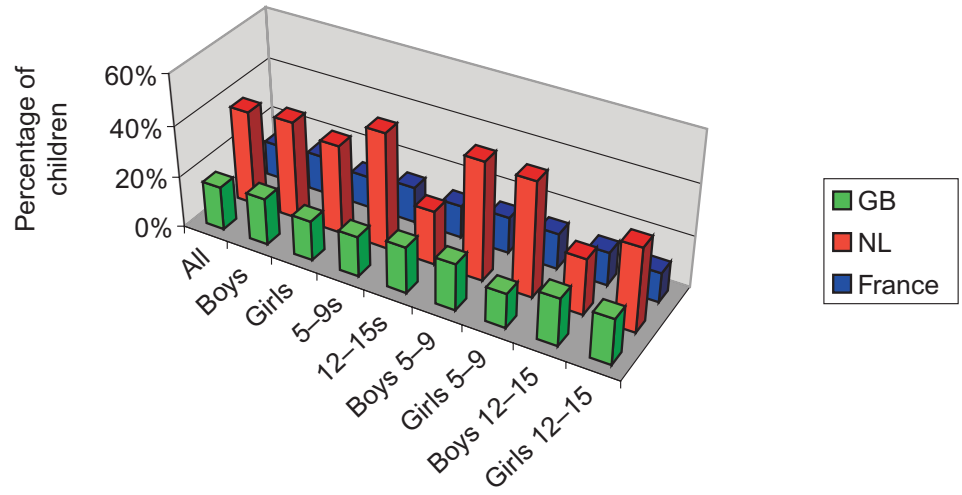
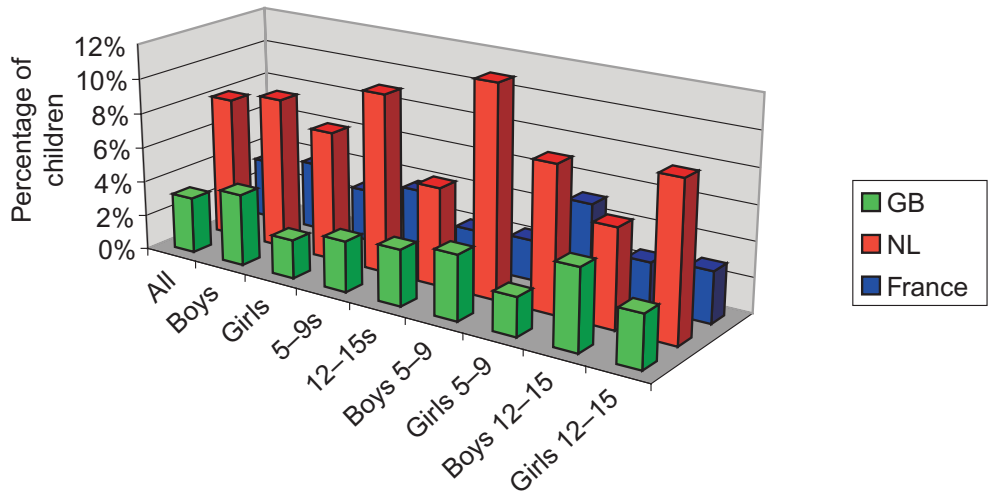


Figure 5.1b Percentage that are cycling during play



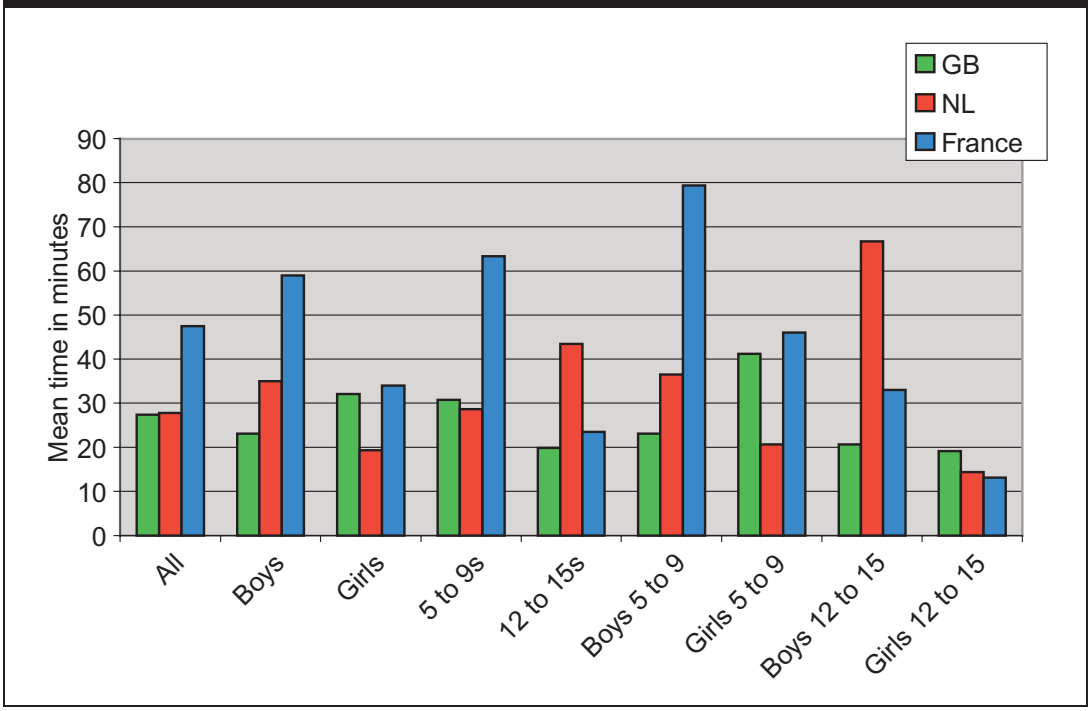
5.3 Variation by age and gender

5.3.1 Figure 5.1 shows that, in all the three countries, boys are more likely to have played in the road environment than girls by a few percentage points. These small differences persist when the data are disaggregated by age as well as sex, except in the Netherlands where there is an extremely strong effect of age, and then of sex in the older group. There, 45% of children in the 5–9 age group report playing in the road environment compared with only 21% of 12–15-year-olds. But in the older group, 33% of girls report playing compared with only 22% of boys. Thus it seems that younger children, and also older girls, are much more likely to play near roads in the Netherlands than in the other countries, and that rollerblades, which are used almost equally by boys and girls, become a significant method of movement. Much

smaller differences between the groups are seen in Britain and France; in Britain older children are slightly more likely than younger children to play in the road environment, while the converse is found in France, but these differences are not significant.

5.3.2 However, larger differences are found in terms of the mean time spent playing by those children who reported the activity (see Figure 5.2). Boys in France spend much more time playing than girls, with 59 minutes and 34 minutes respectively. This difference is less marked in the Netherlands, at 35 versus 19 minutes, and in Britain it is reversed, at 23 and 32 minutes for boys and girls respectively. Older children spend less time 'playing' than younger children in Britain (20 versus 31 minutes) and France (24 versus 63 minutes), but the reverse is true in the Netherlands (43 versus 29 minutes). Of course, there is a danger here with language, in that some older children may consider 'playing' to be undignified, which is why the alternative of 'hanging around' was proffered, but attitudes to the descriptions may vary in the different languages. In France and the Netherlands, the differences between boys become much more marked in the older age groups (33 versus 13 minutes for boys and girls in the 12–15 age group in France, and a remarkable 67 versus 20 minutes in the Netherlands), while in Britain the gap narrows, with girls in the older group spending 19 minutes compared with 21 minutes for the boys. Thus older boys in Britain spend much less time playing in the road environment than do those in the other countries. All this variation is complex and is not readily explained, but it seems clear that patterns of play in Britain are different from those in the other two countries, and in general there is less variation in playing exposure across the age groups or sexes in Britain than there is in France and the Netherlands.

Figure 5.2 Mean time walking during play



5.3.3 It is very tempting to suggest that the high level of traffic protection seen in the Netherlands (as seen in the very high incidence of traffic calming and other special measures to control speed), and the relatively low risks of an accident as examined in the original comparative study (Bly *et al*. 1999), might be encouraging Dutch children to play more frequently, and to spend more time playing, outside their homes and in the (protected) road environment, and their parents to allow it. The study did not examine attitudes, however, and this remains speculation. It seems to apply especially to younger children and girls; it does not seem to apply to older boys. However, this is not because older boys are spending less time outside the house overall: perhaps older boys are less likely to ascribe their time to 'playing' and to describe it in some other category, but this explanation does not seem to apply to older boys in the other countries.

5.4 Socio-economic group

5.4.1 As was the case with visiting friends, there is a contrast between the trend with the socio-economic group (SEG) in Britain, on the one hand, and in France and the Netherlands on the other, but it is by no means clear why this should be so. The trends are not monotonic: in Britain it is the middle groups C1 and C2 that have lower percentages of this activity than either AB or DE, whereas in the other countries the middle group (France) and higher middle group (Netherlands) have a higher percentage playing or hanging around in the road environment. However, these variations in the likelihood of playing are moderated by the mean time spent playing by those who reported playing. There are no very clear patterns there either, in that mean times vary up and down across the different groups without any monotonic trend. But in terms of average exposure (i.e. the likelihood of making a playing trip multiplied by average exposure time when playing), it is clear that the higher SEGs have greater exposure in Britain and France (9.3 minutes in group AB compared with 3.4 minutes for group DE in Britain, 11.9 and 5.5 minutes for the highest and lowest groups in France respectively), while the opposite is true in the Netherlands, where the mean exposure ranges from 4.1 minutes in the highest group to 13.4 minutes in the lowest.

5.4.2 Thus the variation is hard to explain, but as we have seen in other aspects the overall effect of the SEG is different in the Netherlands from that in either Britain or France. The effects of social group are likely to lie in both home location, where in Britain at least it might be argued that the higher groups have safer and more pleasant areas in which children might play (though this might well be away from the road rather than close to it), and in parental attitudes, where it might be argued that parents in higher social groups are more likely to arrange and pay for organised activities for their children away from the road, and to take them there by car. Whether the tension between these two aspects could result in the observed dip in likelihood of playing in the road environment across the SEGs is unclear, and in any case there is no reason to think that they operate differently in the other countries, where the opposite curve is seen. The locational patterns of the different SEGs

relative to the road system are known to be different in the different countries, and this may be at the heart of the observed trends. It remains clear that Dutch children are more likely to play near the road than British or French children in all social groups, and if this has been encouraged by a safer residential road environment it would be interesting to know whether the particularly high incidence in the second highest social group (of five) is at all correlated with a higher incidence of safety measures in the areas occupied by this group. However, it is not possible to determine whether such a correlation exists.

5.5 Ethnicity

5.5.1 There is no difference between the proclivity of white and non-white children to play in the road environment in Britain, while there is a small difference in France where non-white children are slightly more likely to play near roads. In the Netherlands there is a difference, where 54% of non-whites report playing near roads compared with only 36% of whites. However, this is based on a small sample of only 18 children, so little should be read into it.

5.6 Housing

5.6.1 There are few consistent trends in playing relative to housing type. The percentages playing near roads are similar whether the homes are closer than 3 metres or more distant from the road, except for a substantial difference in Britain between children living in flats within 3 metres from the road, only 11% of whom had played in the road environment, and those in flats further from the road, 27% of whom had played in the road environment, compared with about 15% of children who lived in houses, whether nearer or further than 3 metres from the road. In Britain at least, however, there is likely to be a big difference in housing type between flats close to the road and those further from it: the extensive council developments of flats are generally surrounded by considerable non-road space, and children there may well spend time playing around the immediate area, whereas apartments close to the road are more likely to be subdivided smaller buildings, perhaps more closely connected into the urban road environment, where parents may well be reluctant to allow their children to play outside.

5.6.2 There are substantial differences in the likelihood of playing outside houses in different age categories, but the patterns are not readily interpreted, except that there is a higher level of activity in the post-war 1945–65 housing in all three countries (and more still in more recent housing in the Netherlands). There was extensive development of public housing in the post-war period, and much of this may be associated with more limited space within the houses or apartments, and therefore a greater incentive for children to play outside.

5.7 The type of area

5.7.1 In Britain there is very little variation in the amount of play activity between the different types of area, but those in rural areas are slightly more likely to cycle (5% of those in rural areas compared with 3% of city dwellers and 2% of town dwellers). But those that play near roads play for significantly longer in rural areas (30.5 minutes) and towns (29.3 minutes) compared with cities (21.3 minutes). In France, 19% of those living in rural areas play near roads and when cycling is added to this a quarter of those in rural areas play near roads, compared with 15% in towns and 10% in cities. Once again, those that play near roads in rural areas play for the longest (50.3 minutes), and this is very similar to city dwellers (48.1 minutes) but longer than town dwellers (39.7 minutes).

5.8 Accompaniment

5.8.1 Perhaps the most surprising aspect of accompaniment is that a substantial proportion of children are accompanied by older people when playing outside in the road environment. Figure 5.3 shows that this is reported for 15% of British children and a remarkable 34% of French children, but for only 8% of Dutch children, where we see again the apparently more relaxed attitude of Dutch parents towards letting their children walk alone in the road environment. This accompaniment is more marked amongst younger children, but not by much: 17% in the 5–9 age group versus 11% in the 12–15 age group in Britain, 40% versus 30% respectively in France, though only 7.4% versus 6.7% in the Netherlands. In the older age group, of course, the percentages might be biased by the inclusion of people of 16 and over who are friends of the oldest children in the group, rather than supervising adults.

Figure 5.3a Accompaniment by country

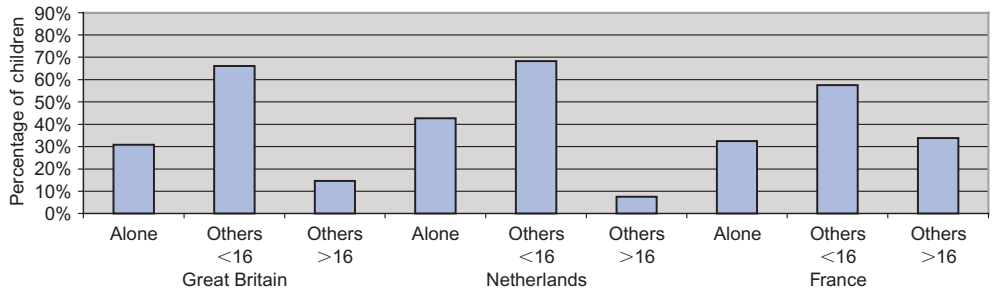


Figure 5.3b Accompaniment by gender

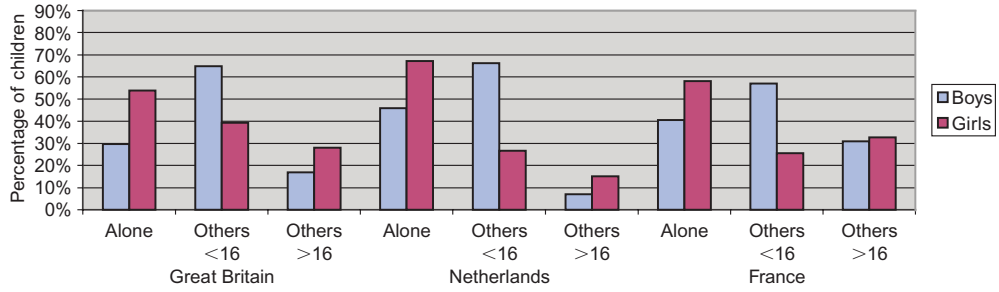


Figure 5.3c Accompaniment by age group

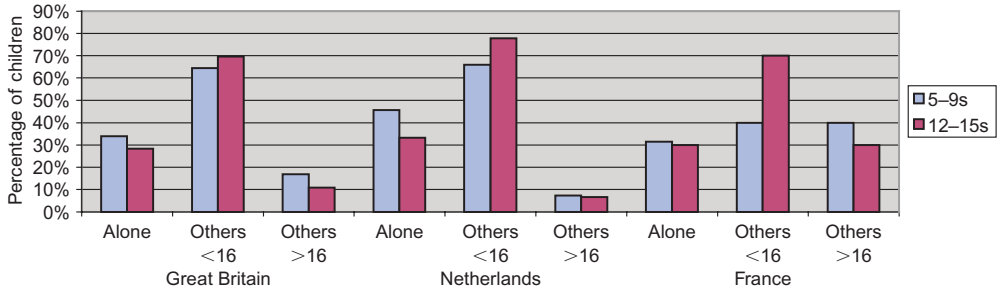


Figure 5.3d Accompaniment by gender for 5–9s

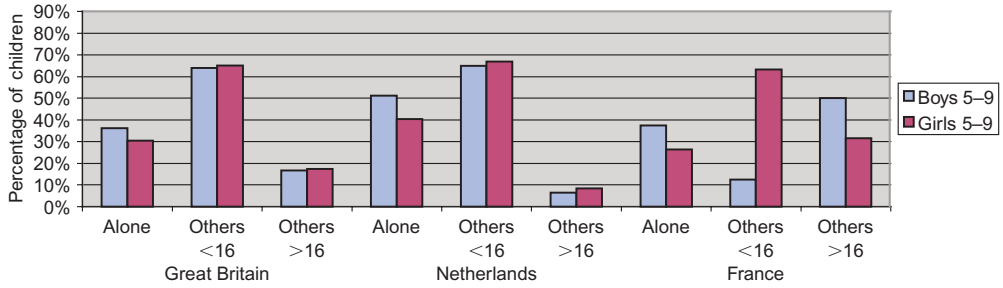
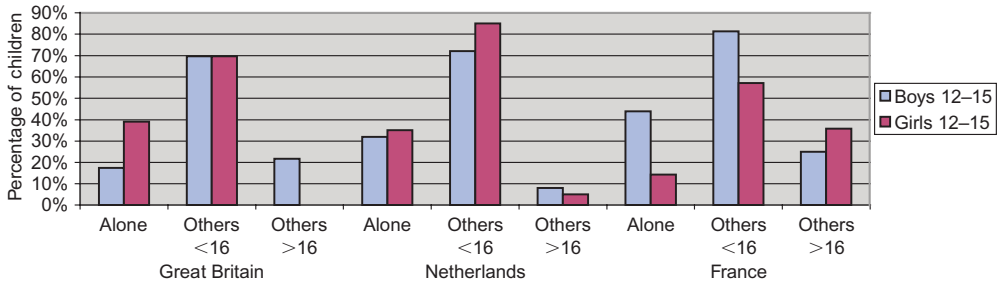


Figure 5.3e Accompaniment by gender for 12–15s



5.8.2 Children in the Netherlands are more likely to be playing alone (43%) than in Britain (31%) or France (33%), and those in Britain and the Netherlands are slightly more likely to be playing with other children than those in France.

5.8.3 There can be overlap between the groups reporting accompaniment by people over and under 16, of course, and it is interesting that whereas this overlap is very large in France (the combined over and under 16 accompaniment accounts for 91% of the reported play, compared with 33% of children playing alone, suggesting that many children playing in France are accompanied by both other children and 'adults' – or at least older teenagers) it is much less common in the other countries:

- in the Netherlands 76% versus 43% playing alone; and
- in Britain 81% versus 31% playing alone.

5.8.4 Perhaps family 'play' (but in the road environment) is more common in France.

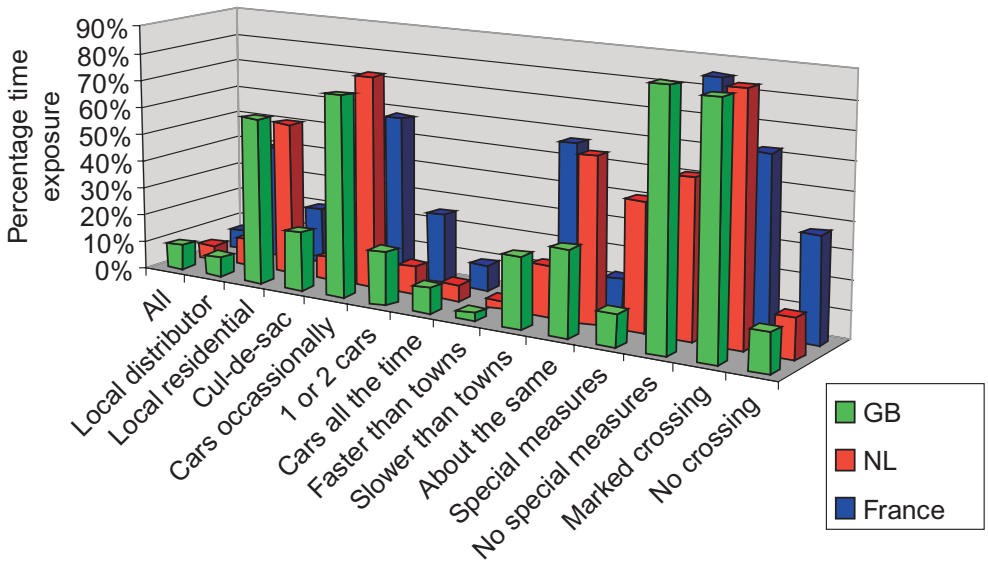
5.8.5 The proportion of children playing alone is larger amongst the lower SEGs in Britain and adult accompaniment is less likely, but the trends are not very significant. The opposite is found in the Netherlands and France, though in France the sample size in the lowest SEG is too small to establish the trend reliably. In the Netherlands, the lower likelihood of playing alone in the lower SEGs is quite marked (22% in the lowest group compared with 49% in the highest), and there is a compensating, though less marked, trend in playing with other children, but there is no consistent trend in the presence of adults. Overall, there are no firm conclusions to be extracted here in regard to road safety.

5.8.6 There are significant differences in play activity in the different area types. In Britain, those living in rural areas were the most likely to play on their own (37%) compared with 28% of both town and city dwellers. Similarly in France, 36% of those living in rural areas played alone compared with 31% in towns and 28% in cities.

5.9 The road environment

5.9.1 As would be expected, playing is much less likely to be close to *main through-roads* than is walking in general, and although main roads account for a much larger proportion of children's overall pedestrian exposure in Britain than in the other countries, when it comes to playing there is little difference, as Figure 5.4 shows. Nine per cent of exposure in Britain is close to main through-roads, compared with 7% in France and 5% in the Netherlands. *Residential roads* account for the majority of exposure, 60% in Britain and 55% in the Netherlands, but perhaps surprisingly not in France, where residential roads account for 20% and local distributors for 41% – in contrast to visiting friends where the dominance of local distributors had disappeared. This might suggest that in France a substantial amount of playing is taking place at some distance from the home, though this may also be true in the

Figure 5.4 Percentage of time exposure by road type, traffic volume and speed, measures to slow traffic and crossing place



other countries but without changing the residential nature of the surroundings. In Britain 21%, in France 23% and in the Netherlands 8% of play activity takes place in cul-de-sacs. This inclination to congregate in cul-de-sacs to play should increase safety.

5.9.2 This difference between the road environment in which children play and that of their wider walking activity is reflected in other road characteristics. Traffic is generally lighter, with traffic passing by 'all the time', for only 9% of exposure in Britain and France, and for 6% in the Netherlands, and traffic passing by 'only occasionally' most of the time (72% in Britain, 58% in France – where local distributor roads might be more heavily trafficked than residential roads – and 76% in the Netherlands). Traffic is also 'slower than most traffic in towns' for 25% of exposure in Britain, 57% in France, but only 18%, unexpectedly, in the Netherlands, where extensive traffic calming in the residential areas of play might be expected to show more clearly. In fact, special measures to slow speeds are slightly less likely to be present in the Netherlands for playing (45% of exposure) than overall (50%) or on the journey to school (54%), and are much less than when visiting friends (65%). They are, however, still much more prevalent than in Britain (11%) or France (15%). Lower speed limits than the urban standard are still much more evident in France (24%) and the Netherlands (25%) than in Britain (7%). It should be noted that the surveys were not able to make quantitative estimates of traffic speed, but that qualitative assessments were made by the fieldwork surveyors. Overall, though, Dutch children spend much more of their time playing in the road (26%), as opposed to the pavement, than do British children (7%), though surprisingly it is the French children who spend the largest proportion of exposure playing on the road (37%).

5.9.3 Parked cars are present at much the same levels as when visiting friends in Britain, but more so in France and the Netherlands, with parked vehicles 'all along the road' for 15% of exposure in Britain, 24% in France and 23% in the Netherlands, though in France there are 'no parked vehicles at all' 43% of the time. Also when roads are crossed in play, the parked cars obstructing the view, which were evident in Britain when children were visiting friends, are now much less likely: they obstructed the view for 19% of crossings in Britain, compared with 31% for visiting friends. Conversely, the situation is worse for playing in France (19%) than it was for visiting, perhaps because of the move towards local distributor roads. Curiously, when it comes to playing, British children are now much less likely to cross the road at an unmarked crossing than for other activities. Indeed, both in Britain and the Netherlands the use of unmarked crossings is small at 14%, while it is the French children (who seem very disciplined in other walking activities) who are using unmarked crossings 37% of the time.

5.10 Conclusions

5.10.1 Overall, the main points to be drawn from the analysis of playing in the road environment are as follows:

- Twenty per cent of children in Britain reported playing or hanging about in the road environment on the day of the survey by ***walk or cycle***, much the same as children (17%) in France but much less than Dutch children (45%).
- In all three countries, ***boys*** are more likely to have played in the road environment than ***girls***, but the differences are small in Britain and France, as are the differences between the ***age groups***. However, there are much stronger differences in the Netherlands, where 45% of children in the 5–9 age group played in the road environment compared with only 21% of 12–15-year-olds, and in the older group 33% of girls report playing compared with only 22% of boys. There are also stronger differences between the age groups in Britain and France in the *time* they spend playing, with older children spending much more time than younger children, though the reverse is true in the Netherlands. Boys and girls in Britain spend similar times playing, whereas in the other countries boys spend substantially more time than girls.
- The higher ***SEGs*** have greater time exposure to the road environment than the lower SEGs in Britain and France, while the opposite is true in the Netherlands.
- There is a higher level of play activity for children living in post-war 1945–65 ***housing*** in all three countries than in older or more recent housing, and a higher level in British flats set further from the road than in flats close to the road or in houses generally.
- There is higher play activity in France for those that live in ***rural areas***, with little variation in Britain.

- Fifteen per cent of British children and a remarkable 34% of French children are ***accompanied*** by people of 16 or over when playing in the road environment, but only 8% of Dutch children are accompanied. Children in the Netherlands are more likely to be playing alone than in Britain or France.
- British children are no more likely to be playing near ***main roads*** than those in the other countries, and in Britain and France there is a surprisingly high use of ***cul-de-sacs***. ***Traffic is lighter and slower*** than for walking exposure generally. There is a high presence of ***special measures*** to slow traffic in the Netherlands, but rather less than for walking exposure in general.
- In Britain and the Netherlands the use of ***unmarked crossings*** is much less common in play than for walking in general, whereas in France it is considerably greater.

6 Analysis of factors affecting accident severity

6.1 Introduction

6.1.1 The original study compared accidents by reference to killed or seriously injured (KSI) accidents only, since the definition and reporting of slight accidents in the three countries is understood to vary. This gave rise to the question of whether the same conclusions would have emerged had it been possible to compare slight as well as KSI accidents. While it is not possible to address this question directly, it was agreed that comparisons of accidents of different severity in Great Britain, and the factors that may influence them, would throw some light on the validity of the original approach. The findings could also be of wider interest in helping to understand factors influencing the severity of child pedestrian accidents in Britain.

6.1.2 This chapter therefore examines the severity of child pedestrian casualties using accident data mainly from 2001. It first examines some of the definitional issues affecting the assessment of accident severity and then examines the ways in which severity may be associated with the features of the accidents concerned. These features are related to the characteristics of the child casualty, the types of vehicle involved and the various attendant circumstances which might be influential, such as the location, time and weather conditions.

6.2 STATS19

6.2.1 The STATS19 system is intended to cover all road accidents in Great Britain involving personal injury. Injuries to casualties are classified as fatal, serious or slight. For an accident to be classified as fatal, at least one person must have died as a result of the accident and within 30 days of the accident. A serious accident involves casualties with injuries covering a range of conditions, including broken bones, severe bruising, any conditions requiring treatment as an in-patient in a hospital, and (at the most severe end of the range) death after 30 days. Accidents not involving fatal or serious casualties are classified as slight. Accidents that do not involve personal injury are not included on STATS19.

6.2.2 There is some under-reporting of injury accidents in STATS19. All accidents involving personal injury that are reported to the police are recorded, but there is evidence that many slight accidents, and some serious accidents, are not reported. Any variation in the extent to which accidents are reported can therefore affect comparisons between one year and another, and between one group of road users and another. The general view is that the degree of under-reporting has not changed much in recent years.

6.3 Trends in child pedestrian casualties

6.3.1 The DfT publication *Road Accidents Great Britain* (2002) summarises recent trends in child pedestrian casualties who were killed or seriously injured. There was a general improvement in child pedestrian casualties in the 1990s.

6.3.2 Over the period 1994–98 on average there were 2270 boys aged 5 to 15 inclusive who were killed or seriously injured each year. By 1999, this figure had fallen to below 2000 per year and the figure for the year 2001 (1825) was 20% below the 1994–98 average.

6.3.3 For girls aged 5 to 15, the number killed or seriously injured averaged 1325 in the 1994 to 1998 period. There was a steady fall in the total during the second half of the 1990s and by the year 2001 it was just over 1000, 24% below the 1994–98 average.

6.3.4 Using STATS19 data for 2001 and 2000, we can examine the factors associated with these casualties in more detail.

6.4 The factors affecting child pedestrian casualties and their severity

6.4.1 The STATS19 system does not attempt to identify specific causes of road accidents. In practice a large number of factors will be at work, and not all of these can be recorded systematically. STATS19 does, however, identify certain objective features concerning the casualties, the vehicles involved and the general circumstances at the site. These features may help to identify the factors that are at work. Of particular interest in the current context are the factors that tend to make child pedestrian accidents fatal or serious, rather than involving only slight injuries. We consider some of the potential factors below.

6.4.2 The characteristics of the child will be highly influential. Boys are well known to be less averse to taking risks and this applies in the road safety field where, as we have seen above, they are 50% more likely than girls to receive fatal or serious injuries. The original study showed that variations in exposure by age and gender in Britain is fairly small, and for the most part the differences are not statistically significant, suggesting that exposure is not a factor in this instance. Age is also influential, and we can use the STATS19 reports to establish where the children were in relation to the carriageway and what they were doing at the time of the accident.

6.4.3 The types of vehicle involved in child pedestrian accidents may also influence the severity of the injury. In principle, other information about the vehicles, such as the vehicle manoeuvres, age of the driver or whether he/she was breath-tested could also be relevant. However, in the context of this study, and to be consistent with the Child Pedestrian Exposure and Accidents European Comparative Study, it is more relevant

to concentrate on the other attendant circumstances. Of particular interest would be the speed at which the involved vehicles were travelling at the time of the accident, but – not surprisingly – this is difficult to obtain objectively and we have to use other information about the accident sites to make inferences about typical speeds in various circumstances.

6.4.4 It is important to examine a number of potential factors on the STATS19 Attendant Circumstances record. The severity of child pedestrian accidents will potentially be affected by the location (including the road class, which may give an indication of the prevailing speed), the time of day (and possibly the day of week, and the season), the weather and the visibility.

6.5 Measure of average child pedestrian casualty severity

6.5.1 Given the information from STATS19, we can measure the average severity of a given type of accident or casualty by the proportion that involved death or serious injury. Thus in 2001 there were 14,108 child casualties aged between 5 and 15: of these, 2826 were killed or seriously injured, making a severity rate of 20%.

6.5.2 This measure of accident severity is unfortunately affected by the extent to which certain types of accident may be unreported. The reporting rate for slight accidents is understandably lower than for the more serious accidents, and to this extent the KSI rate derived from STATS19 is an overestimate. There is the additional complication that the reporting rate may vary from year to year, although it is generally to be expected that the reporting rates in successive years will be comparable. There is some concern that child casualties – and, in particular, child pedestrian casualties – may be less well reported than adult casualties. It is likely that in some cases the overriding priority to obtain medical treatment for the child means that the accident itself is not notified to the police.

6.6 Tables of comparative accident severity

6.6.1 In this section we examine STATS19 data for 2001 in order to assess the circumstances in which child pedestrian casualties are most likely to be fatal or serious. Data for 2000 have also been examined and in most instances give rise to similar conclusions. In the commentary below we have concentrated on those results that are the most statistically significant. We do not show the full statistical tests involved, but these would normally be based upon standard contingency tables, where the distribution of KSI casualties over a particular attribute (e.g. the age of the casualty) is compared with the distribution of slight casualties; for statistical significance we would expect there to be less than 5% probability that the differences were due to chance. Sometimes apparently significant results may be of little consequence because the number of cases is comparatively small, and we note such cases in the commentary.

6.6.2 The results of these comparisons are shown in summary form in Appendix A on pages 85–87. At the top of this table is a comparison of casualties and KSI rates by age and gender in 2001. This comparison is then expanded in the sub-tables below. These sub-tables cover:

- the characteristics of the child pedestrian;
- the accident location;
- when the accident occurred;
- the vehicles involved; and
- the weather and lighting conditions.

Age and gender

6.6.3 Boys had higher injury severity (22% KSI) at all ages than girls (18%). These figures provide a benchmark for comparison with the sub-tables that follow.

6.6.4 Boys also had approximately 50% more casualties in total than girls. This discrepancy between boys' and girls' casualties, and between their severity rates, is evident in all the various sub-tables that follow, and almost certainly reflects the tendency of boys to undertake more risky behaviour or to be exposed to more risky environments.

6.6.5 There was little difference in severity rates by age. Boys had severity rates of 22% for both 5–9-year-olds and 12–15-year-olds. Severity rates for young and old girls were also similar, though the rate for 5–9-year-olds (17%) was slightly lower than the overall rate (18%).

Pedestrian characteristics

6.6.6 In terms of location, most child pedestrians were crossing the road away from a pedestrian crossing. The lowest severities, 14% for boys and 11% for girls, were when the children were on the footway. A possible reason for this lower severity is that a driver veering onto the footway – perhaps as a result of a collision or to avoid a collision with another vehicle – may often have reduced his speed before the moment of impact with the child.

6.6.7 In terms of the child pedestrian's own movements, most casualties occurred when the child was crossing the road. Severity was higher than average (23% for boys and 20% for girls) when the boy or girl was crossing the road and was masked by a stationary vehicle (which could be parked or simply held up in a queue of traffic). Boys had particularly high severity rates (27%) when standing in the carriageway; this would cover cases where the boys were not crossing or walking along the road, such as playing games in the road. Severity rates were lowest (18% for boys and 8%

for girls) when the child was walking along the carriageway, although the number of such cases was small.

6.6.8 Severity rates were lower for children on the way to or from school (19% for boys and 16% for girls) than for other journeys. This may reflect the presence of 'school crossing patrols' (lollipop wardens) and the fact that roads near to schools tend to have 30 mph or lower speed limits. It may also reflect the local knowledge of schools by the local traffic, the presence of many children making drivers more wary and the general volume of traffic around schools at peak times.

Accident location

6.6.9 Accidents at or near junctions tended to have lower severity rates (20% for boys and 17% for girls) than accidents away from junctions, possibly because drivers may have slowed down for the junction and they may have been more prepared for incidents.

6.6.10 Severity increased systematically with the speed limit at the site. For boys, severity ranged from 21% at 20/30 mph to 41% on 50/60 mph roads. For girls, severity ranged from 14% at 20 mph sites to 36% at 50/60 mph roads. This suggests that, as might be expected, the vehicle speed at impact had a direct effect on injury severity.

6.6.11 Severity was higher on major roads (mainly class A) than on minor roads, again reflecting the underlying speed of the traffic.

When accidents occur

6.6.12 Child pedestrian injury severity was lowest in the morning (between 0700 and 1200) when the rate for boys was 16% and the rate for girls 13%. It was highest in the evening and at night (1800–0700) when the rate was 26% for boys and 24% for girls. There may be a number of reasons for these differences, including poor visibility at night and the relative speed of the traffic at different times of the day.

6.6.13 Severity rates tended to be higher at weekends: 23 or 24% for boys, and 21% for girls.

6.6.14 There appear to be no marked seasonal differences in the severity rates, but the summer severity rates (22% for boys and 19% for girls in May to September) were marginally higher than the winter severity rates (21% and 17% respectively).

Vehicles involved

6.6.15 Most child pedestrian casualties were hit by cars. Accidents with larger vehicles (mainly lorries, buses and vans) had higher severity rates than average (26% for boys and 23% for girls), reflecting the increased intensity of the impact when a

heavy vehicle is involved. For young boys and girls, the severity rates when large vehicles were involved was higher still (28% for boys and 24% for girls). The rates for accidents involving motorcycles and pedal cycles were not statistically reliable, being based upon small numbers; in the case of pedal cycle involvements, the figures may be particularly affected by under-reporting.

Weather and lighting

6.6.16 In adverse weather conditions, such as rain, fog, snow and high winds, severity was generally slightly lower than in fine conditions (21% for boys and 17% for girls). The one exception was for older girls in 2001 (but not in 2000), who had slightly higher severity rates in adverse conditions (20%). It is not clear why overall severity rates were lower during adverse weather conditions, but possibly drivers were travelling more slowly than in fine conditions.

6.6.17 In terms of lighting conditions, accidents that occurred in darkness had higher severity rates (26% for boys and 22% for girls) than those in daylight. This tends to confirm the earlier finding that evening and night-time accidents had higher severity rates than those in the daytime.

6.7 Conclusions

6.7.1 The two main findings on the severity rates for child pedestrian casualties are:

- that ***boys*** have significantly higher severity rates than ***girls***, as well as more casualties in total – this finding holds at all ages and under virtually all accident circumstances; and
- that amongst the various factors associated with higher severity rates, those connected with ***vehicle speed*** are the most influential – in particular, there is a strong association with speed limits at the accident sites; the higher the speed limit, the higher the severity.

6.7.2 Other factors associated with increased severity are accidents in ***darkness*** and at ***weekends***, accidents where ***heavy vehicles*** were involved, and accidents ***away from junctions***. Adverse weather conditions were associated with slightly lower severity rates.

6.7.3 Severity rates generally did not vary greatly by age, although ***girls aged 5–9*** had slightly lower severity rates than those aged 12–15.

6.7.4 The number and severity of child pedestrian accidents declined since the mid-1990s. These year-to-year comparisons are probably not affected by under-reporting of accidents, but the tendency to under-report slight accidents more than serious accidents means that the severity rates in Appendix A pages 85–87 (22% for boys and 18% for girls, and the other more detailed figures) are overestimates of the proportion of injuries that are fatal or serious.

7 Comparisons with the findings from other British studies

7.1.1 This final chapter considers the question 'how do these results compare to other studies of exposure conducted in Great Britain?'.

7.1.2 A number of surveys of child pedestrian exposure have been conducted over the past 10 years that offer opportunities for comparison in terms of several of the key variables that have been the focus of further analysis in this report. The following studies were all based on a self-completion questionnaire survey methodology, with very different samples:

- The National Travel Survey (most recently 1997/1999) – a nationally representative sample of households covering residents of Great Britain, administered by the Office for National Statistics on behalf of the DfT. Every household member in the sample is asked to keep a seven-day travel diary, and adult carers keep a diary for young children. The diary covers journey purpose, modes of transport, time taken, journey origin and destination.
- Towner *et al*. (1994) – a survey amongst school children aged 11–14 in Newcastle upon Tyne. The aim of the survey was to measure exposure to injury risk for school children aged 11–14 and how the risk varied with gender, age and socio-economic factors. The study compared lower and higher secondary school children using relative risk estimates.
- Ward *et al*. (1994) – this study covered a cross section of households in Northampton. While there was only a small number of children in the sample, the study provides some useful pedestrian exposure data.
- Hillman *et al*. (1990) – surveys were undertaken in southern and central England as part of an analysis of trends in child pedestrian exposure between English and German towns over the past 20 years.
- Tight (1987) – a survey amongst school children in Bradford, Bristol, Nelson, Sheffield and Reading as part of a study investigating child pedestrian accident risk.

7.1.3 Most of these studies have been ad hoc research projects, which differ in the level of details and geographic coverage, though the National Travel Survey is of course based on routinely collected travel information. Most of these studies provide some common indicators of exposure, such as the number of journeys by mode and purpose, time spent travelling, number of roads crossed and levels of accompaniment. In addition, slightly different age bands have been used and different types of analysis have been undertaken, and this limits the validity of comparisons. As noted, most have involved self-completion daily travel questionnaires, and many of the exposure surveys relate to particular geographic

areas within Great Britain. It is important to take this into account when comparing and interpreting the results because it has been shown (Tight 1987) that there can be marked geographical differences in the levels of exposure amongst children living in different regions.

7.1.4 Table 7.1 below sets out the results of an assessment of the consistency of the findings from this study and other studies of exposure conducted in Great Britain. It seems that where there are comparable exposure measures, the results of this study are very consistent with other studies. While some of the age-related findings reflect the increasing independence of older children, this study confirms gender differences in the higher levels of accompaniment of girls, the higher use of bicycles by boys and the longer exposure of boys on school journeys. Further research will, however, be required to investigate whether these differences relate to the permissiveness or restrictedness of the parent or adult carer level, or the behavioural differences amongst boys and girls.

Table 7.1 Comparisons with other studies

MVA findings	Other studies which have similar findings
Secondary school children spent more time per walked journey compared to primary school children	NTS (1997/99) Towner *et al*. (1994) Tight (1987)
Girls are more likely to be accompanied than boys	NTS (1997/99) Towner *et al*. (1994) Hillman *et al*. (1990) Tight (1987)
Younger children are more likely to be accompanied than older children	NTS (1997/99) Towner *et al*. (1994) Tight (1987)
Around half of children walk to school	NTS (1997/99) Towner *et al*. (1994) Hillman *et al*. (1990) Tight (1987)
Boys take longer on the school journey compared to girls	Towner *et al*. (1994) Tight (1987)
Younger children are more likely to walk to school than older children	NTS (1997/99) Towner *et al*. (1994) Ward *et al*. (1994) Hillman *et al*. (1990) Tight (1987)
Children from the lowest socio-economic group are more likely to walk on the school journey	Towner *et al*. (1994)
Children from low socio-economic groups are less likely to travel by car	Towner *et al*. (1994)
Boys are much more likely to cycle on the school journey compared to girls	NTS (1997/99) Towner *et al*. (1994) Tight (1987)

References

Hillman M, Adams J and Whitelegg J (1990). *One false move: a study of children's independent mobility*. London: Policy Studies Institute.

National Travel Survey (NTS) (1997/99). www.transtat.dtlr.gov.uk

Tight MR (1987). *Accident involvement and exposure to risk for children as pedestrians on urban roads*. PhD Thesis. University College London.

Towner EML, Jarvis SN, Walsh SSM and Aynsley-Green A (1994). Measuring exposure to injury risk in schoolchildren aged 11–14. *British Medical Journal* **308**: 449–52.

Ward H, Cave J, Morrison A, Allsop R and Evans A (1994). *Pedestrian activity and accident risk*. Basingstoke: AA Foundation for Road Safety Research.

Appendix A

Results of the analysis in detail

Activity on foot for all purposes				
All journeys		**GB**	**NL**	**France**
		Walk only	**Walk only**	**Walk only**
All		67.00%	51.70%	67.90%
Boys		67.20%	50.80%	66.40%
Girls		66.90%	52.50%	69.30%
5–9s		65.70%	54.60%	68.50%
12–15s		70.30%	46.80%	66.30%
Boys 5–9		67.20%	54.00%	68.10%
Girls 5–9		64.30%	55.10%	68.90%
Boys 12–15		67.10%	44.10%	64.40%
Girls 12–15		73.30%	49.20%	68.50%
SEG of main income earner	AB	60.60%	47.00%	67.30%
	C1	68.10%	53.50%	67.80%
	C2	67.60%	51.10%	74.20%
	DE	76.50%	50.40%	
			55.40%	
Housing type of respondent	Flat entrance < 3 m from road	66.20%	58.00%	70.40%
	Flat entrance > 3 m from road	68.90%	44.70%	72.30%
	House front door < 3 m from road	71.30%	52.50%	63.90%
	House front door > 3 m from road	64.10%	51.30%	61.00%
	Other	72.80%	56.20%	74.70%
Ethnic group of respondent	White	66.70%	51.50%	67.60%
	Non-white	75.40%	57.90%	70.90%
Houses dating before 1920		69.30%	57.30%	74.80%
Houses dating from 1920–45		66.90%	50.30%	67.90%
Houses dating from 1945–65		68.70%	57.70%	71.10%
Houses dating after 1965		65.30%	50.20%	65.80%

Mean time per walking trip							
All journeys		**Great Britain**		**Netherlands**		**France**	
	Total	**Mean walking time per journey**	**SDM**	**Mean walking time per journey**	**SDM**	**Mean walking time per journey**	**SDM**
All	1132	16.66	1.07	9.41	0.61	10.34	0.63
Boys	555	16.57	1.86	9.59	1.00	11.26	1.16
Girls	577	16.75	1.10	9.23	0.68	9.5	0.57
5–9s	511	14.05	1.08	9.14	0.65	11.95	1.33
12–15s	407	17.97	0.98	14.14	2.20	8.57	0.55
Boys 5–9	255	12.95	1.15	9.05	1.02	13.81	2.59
Girls 5–9	256	15.15	1.83	9.23	0.79	10.29	1.00
Boys 12–15	190	18.11	1.52	18.59	4.55	8.47	0.82
Girls 12–15	217	17.85	1.26	10.25	1.06	8.67	0.74
AB	219	28.93	4.90	4.42	0.54	12.96	1.54
C1	311	12.1	0.92	7.44	0.56	9.69	0.71
C2	258	18.44	1.31	9.7	1.25	7.47	1.49
DE	344	11.65	0.79	12.33	1.35		
				14.06	2.04		
Flat entrance < 3 m from road	42	11.64	1.82	6.59	1.22	10.39	1.55
Flat entrance > 3 m from road	168	15.14	1.28	7.51	1.84	9.93	0.85
House front door < 3 m from road	369	16.99	2.67	9.39	0.73	10.58	1.63
House front door > 3 m from road	508	17.42	1.27	9.87	0.93	11.15	1.21
Other	15	20.95	3.54	5.51	0.82	8	1.81
White	1045	17.13	1.15	9.34	0.64	9.87	0.60
Non-white	87	11.03	1.93	10.39	1.76	16.37	3.99
Pre-1920s circled	94	14.4	1.88	10.46	1.80	11.21	1.39
1920–45 circled	267	13.1	0.96	6.48	0.78	9.17	1.32
1945–65 circled	260	21.98	3.99	11.9	1.93	11.48	2.07
Post-1965 circled	420	17.04	1.21	9.3	0.74	9.58	0.62

Accompaniment – all purposes												
	Great Britain				Netherlands				France			
	Base	Alone	Others <16	Others >16	Base	Alone	Others <16	Others >16	Base	Alone	Others <16	Others >16
All	1043	36.10%	37.90%	38.50%	2293	42.10%	35.90%	24.00%	1917	36.80%	26.00%	39.60%
Boys	519	38.90%	36.40%	36.40%	1178	45.20%	34.70%	22.10%	920	40.50%	25.90%	36.10%
Girls	524	33.40%	39.30%	40.60%	1115	38.80%	37.20%	26.10%	997	33.30%	26.20%	42.80%
5–9s	476	23.50%	25.40%	62.80%	1249	35.70%	34.50%	31.70%	765	21.80%	15.90%	63.80%
12–15s	371	47.70%	54.20%	12.40%	453	55.00%	34.90%	12.80%	768	51.20%	27.90%	23.40%
Boys 5–9	241	27.00%	25.30%	57.70%	648	38.70%	31.60%	31.20%	362	26.80%	13.80%	60.50%
Girls 5–9	235	20.00%	25.50%	68.10%	601	32.40%	37.60%	32.30%	403	17.40%	17.90%	66.70%
Boys 12–15	177	49.70%	50.80%	15.30%	208	62.00%	31.30%	10.60%	381	55.40%	29.90%	17.30%
Girls 12–15	194	45.90%	57.20%	9.80%	245	49.00%	38.00%	14.70%	387	47.00%	25.80%	29.50%

Percentage of exposure time by road/traffic category			
Road type	**Country**		
	GB	**NL**	**France**
	%	%	%
Main through-road	25	7	15
Local distributor road	17	14	53
Local residential road	39	47	14
Volume of traffic	**Country**		
	GB	**NL**	**France**
	%	%	%
Cars passing by only occasionally	51	64	34
Most of the time you could see 1 or 2 cars driving along the road	21	15	32
Cars passing by all the time	26	12	25
Traffic speed	**Country**		
	GB	**NL**	**France**
	%	%	%
Faster than most traffic in towns	11	4	10
Slower than most traffic in towns	15	19	34
About the same speed as most traffic in towns	48	54	39
Presence of measures to slow traffic	**Country**		
	GB	NL	France
	%	%	%
Special measures to slow down traffic	15	50	27
No special measures to slow down traffic	85	50	73
Crossing place	**Country**		
	GB	NL	France
	%	%	%
Proper marked crossing	18	21	66
Not a proper marked crossing	82	79	34

Per cent that walked or cycled all the way to school						
	Great Britain		Netherlands		France	
	Walk	Cycle	Walk	Cycle	Walk	Cycle
All	56	0.9	34.3	36.1	54.1	1.4
Boys	58.5	1.8	33.9	39.2	53.3	2.5
Girls	57	0	34.6	32.5	54.8	0.4
5–9s	63.1	0	40.6	30.8	60.8	0
12–15s	47.8	2.2	15.3	54.7	44.4	2.4
Boys 5–9	63.3	0	37	34.1	64.1	0
Girls 5–9	62.9	0	44.8	26.9	57.9	0
Boys 12–15	44.6	4.6	14.5	60.9	39.1	3.4
Girls 12–15	50.7	0	16.2	48.5	50	1.2
AB	45	0	31.1	44.5	48	0.8
C1	50	0.8	35.7	36.7	55.5	1.8
C2	63	3	35	29	63.3	0
DE	75	0	34.7	30.6		
			29.4	38.2		
Flat $<$ 3 m	47.1	0	55.6	22.2	61.6	0.7
Flat $>$ 3 m	70.2	0	28.6	32.1	62.3	1.9
House $<$ 3 m	62.1	0	31.5	41.1	63.3	0
House $>$ 3 m	52.1	1.9	35	34.5	36.9	2.1
White	57.5	1	34.3	36.3	52.4	1.5
Non-white	64.3	0	37.5	20.8	75	0
House built pre-1920	76.5	0	36	44	61.5	0
House built 1920–45	55.6	2.2	40	23.6	52.8	0
House built 1945–65	56.8	1.1	41.9	26.9	55.6	1.2
House built post-1965	54.3	0.5	33.2	37.9	49.7	2.1

Mean time per walking trip to school			
		Mean time walking per journey	Standard deviation
Great Britain	All	15.55	59.57
	Boys	19.63	81.97
	Girls	11.1	8.77
Netherlands	All	8.69	37.24
	Boys	5.27	3.95
	Girls	12.53	53.98
France	All	11.3	9.09
	Boys	12.03	9.85
	Girls	10.61	8.3

Accompaniment to school									
	Great Britain			Netherlands			France		
	Alone	Others <16	Others >16	Alone	Others <16	Others >16	Alone	Others <16	Others >16
Boys	31.7	31.7	46	46.1	36.5	33.6	40.8	27.5	39.8
Girls	28.1	38.2	50	34.4	40	42.2	37	28.7	42.6
5–9s	15.7	16.5	76	31.1	34.4	49.2	22.7	15.5	69.1
12–15s	46.8	64.5	6.5	66.7	27.8	27.8	62.9	40.3	6.5
Boys 5–9	16.7	18.2	72.7	34.4	31.1	50.8	31.3	19.6	58.8
Girls 5–9	14.5	14.5	80	27.9	37.7	47.5	13	10.9	80.4
Boys 12–15	51.7	58.6	6.9	77.8	22.2	11.1	56	48	0
Girls 12–15	42.4	69.7	6.1	55.6	33.3	4.44	67.6	35.1	10.8

Percentage of exposure time to school by road/traffic category			
Type of road	**Country**		
	GB	**NL**	**France**
	%	%	%
Main through-road	25	6	14
Local distributor road	17	22	51
Local residential road	41	41	16
Volume of traffic	**Country**		
	GB	**NL**	**France**
	%	%	%
Cars passing by only occasionally	37	45	23
Most of the time you could see 1 or 2 cars driving along the road	26	24	45
Cars passing by all the time	31	22	26
Traffic speed	**Country**		
	GB	**NL**	**France**
	%	%	%
Faster than most traffic in towns	12	5	7
Slower than most traffic in towns	18	16	31
About the same speed as most traffic in towns	50	54	45
Presence of measures to slow traffic	**Country**		
	GB	**NL**	**France**
	%	%	%
Special measures to slow down traffic	19	54	11
No special measures to slow down traffic	82	46	89
Type of crossing	**Country**		
	GB	**NL**	**France**
	%	%	%
Special crossing place	17	26	72
No special crossing place	83	74	28

Per cent that walked or cycled to visit friends

	Great Britain		Netherlands		France	
	Walk	Cycle	Walk	Cycle	Walk	Cycle
	%	%	%	%	%	%
All	23.4	1.8	24.1	14.4	15.5	1.3
Boys	21.6	2.3	21.9	13.8	15.9	1.8
Girls	25.1	1.4	26.5	15	15.1	0.8
5–9s	19.3	2.3	25	12.9	10.3	0.7
12–15s	29.9	1.5	22.6	17.7	21.5	1.8
Boys 5–9	17.7	2.8	22.5	11.6	9.4	0.9
Girls 5–9	20.9	1.8	27.7	14.2	11.2	0.5
Boys 12–15	27.6	2.9	19.7	16.9	23.3	2.6
Girls 12–15	32.4	0	25.8	18.6	19.7	1.1
AB	18.3	2.2	23.2	13.7	16.8	1.6
C1	25.5	2.2	24.3	17.1	14.8	1.3
C2	27.4	1.8	24.6	14.3	17.9	0
DE	22.2	1.2	23.8	12.1	25	13
Flat $<$ 3 m	19.6	2.2	17.6	5.9	13.5	0.4
Flat $>$ 3 m	18.8	2.3	20.6	5.9	19.6	2.1
House $<$ 3 m	23.6	2	25.8	16.2	8.5	3.8
House $>$ 3 m	25.5	1.7	24	14.6	16.2	0.9
White	23.9	2	24.2	14.4	15.7	1.4
Non-white	16.4	0	23.1	18	12.8	0
House built pre-1920	21.1	1.1	26.3	10.6	15.1	0.6
House built 1920–45	23.4	1.3	24.4	18.1	17.4	1
House built 1945–65	23.4	2.3	28.9	9.4	20.7	2.1
House built post-1965	24	2.5	22.3	14.7	15.1	1.5

Mean time per visiting journey

	Great Britain		Netherlands		France	
	Mean time walking per journey	Standard deviation	Mean time walking per journey	Standard deviation	Mean time walking per journey	Standard deviation
All	10.66	13.75	6.65	9.16	10.04	8.82
Boys	9.55	12.83	7.17	9.54	9.12	8.59
Girls	11.68	14.54	6.18	8.83	10.95	9.02
5–9s	10.03	9.95	5.66	8.3	7.59	4.56
12–15s	11.49	15.96	10.61	12.35	11.49	9.88
Boys 5–9	9.31	11.75	5.94	10.38	6.32	3.93
Girls 5 –9	10.69	8.13	5.39	5.87	8.49	4.89
Boys 12–15	10.52	15.08	11.86	9.36	10.54	10.16
Girls 12–15	12.33	16.81	9.48	14.69	12.56	9.6

Visiting journey accompaniment										
		Great Britain			Netherlands			France		
	Base	Alone	Others <16	Others >16	Alone	Others <16	Others >16	Alone	Others <16	Others >16
All	171	63.70%	33.30%	21.60%	70.90%	26.50%	11.90%	67.00%	22.60%	26.40%
Boys	82	74.40%	26.80%	14.60%	75.00%	26.40%	8.30%	76.50%	19.60%	19.60%
Girls	89	53.90%	39.30%	28.10%	67.10%	26.60%	15.20%	58.20%	25.50%	32.70%
5–9s	57	38.60%	35.10%	45.60%	62.80%	30.80%	17.90%	47.60%	9.50%	47.60%
12–15s	82	74.40%	40.20%	6.10%	84.60%	17.90%	2.60%	75.00%	20.30%	21.90%
Boys 5–9	27	55.60%	25.90%	29.60%	63.20%	31.60%	15.80%	87.50%	0.00%	12.50%
Girls 5–9	30	23.30%	43.30%	60.00%	62.50%	30.00%	20.00%	23.10%	15.40%	69.20%
Boys 12–15	38	84.20%	31.60%	7.90%	100.00%	5.60%	0.00%	75.80%	21.20%	21.20%

Per cent of exposure time to visitor journeys by road/traffic type			
Percentage exposure by road type	**Country**		
	GB	**NL**	**France**
	%	%	%
Main through-road	12	2	30
Local distributor road	29	10	18
Local residential road	38	69	32
Volume of traffic	**Country**		
	GB	**NL**	**France**
	%	%	%
Cars passing by only occasionally	75	77	39
Most of the time you could see 1 or 2 cars driving along the road	14	18	24
Cars passing by all the time	11	3	26
No information	*	3	12
Percentage exposure time by traffic speed	**Country**		
	GB	**NL**	**France**
	%	%	%
Faster than most traffic in towns	9	1	11
Slower than most traffic in towns	6	23	33
About the same speed as most traffic in towns	60	39	41
Percentage exposure time by type of measures to slow traffic	**Country**		
	GB	**NL**	**France**
	%	%	%
Special measures to slow down traffic	4	65	15
No special measures to slow down traffic	96	35	85
Percentage crossings by type of crossing	**Country**		
	GB	**NL**	**France**
	%	%	%
Special crossing place	10	85	63
No special crossing place	90	15	37

Per cent that played by walk/cycle

	Great Britain		Netherlands		France	
	Walk	Cycle	Walk	Cycle	Walk	Cycle
	%	%	%	%	%	%
All	16.9	3.2	37	8.1	13.6	3.4
Boys	18.3	4.1	38.4	8.7	14.8	3.9
Girls	15.5	2.2	34.8	7.4	12.4	3
5–9s	15.7	2.9	45.4	10.2	14	3.7
12–15s	18	3.2	21	5.6	12.6	2.1
Boys 5–9	18.1	3.7	46.1	12	14.1	2.3
Girls 5–9	13.3	2.2	44.7	8.3	13.9	5.1
Boys 12–15	18.4	4.6	21.8	5.6	12.9	2.6
Girls 12–15	17.7	3	32.6	8.9	11.5	2.9

Mean time per playing journey

	Great Britain		Netherlands		France	
	Mean time walking	Standard deviation	Mean time walking	Standard deviation	Mean time walking	Standard deviation
All	27.43	48.01	27.77	75.74	47.53	96.69
Boys	23.12	31.69	34.97	98.76	58.92	109.79
Girls	32.1	60.88	19.32	30.48	34.03	77.23
5–9s	30.76	57.85	28.62	64.22	63.33	126.93
12–15s	19.85	26.63	43.47	144.28	23.54	42.77
Boys 5–9	23.08	36.48	36.56	84.07	79.4	151.24
Girls 5–9	41.18	77.7	20.61	32.63	45.98	94.08
Boys 12–15	20.65	24.31	66.71	191.08	33.03	56.76
Girls 12–15	19.13	28.97	14.42	22.1	13.15	13.12

Playing journey accompaniment										
		Great Britain			Netherlands			France		
	Base	Alone	Others <16	Others >16	Alone	Others <16	Others >16	Alone	Others <16	Others >16
All	130	30.80%	66.20%	14.60%	42.70%	68.30%	7.50%	32.50%	57.50%	33.80%
Boys	71	29.60%	64.80%	16.90%	45.90%	66.20%	7.00%	40.50%	57.10%	31.00%
Girls	59	32.20%	67.80%	11.90%	39.00%	70.60%	8.10%	23.70%	57.90%	36.80%
5–9s	59	33.90%	64.40%	16.90%	45.70%	66.00%	7.40%	31.40%	40.00%	40.00%
12–15s	46	28.30%	69.60%	10.90%	33.30%	77.80%	6.70%	30.00%	70.00%	30.00%
Boys 5–9	36	36.10%	63.90%	16.70%	51.10%	64.90%	6.40%	37.50%	12.50%	50.00%
Girls 5–9	23	30.40%	65.20%	17.40%	40.40%	67.00%	8.50%	26.30%	63.20%	31.60%
Boys 12–15	23	17.40%	69.60%	21.70%	32.00%	72.00%	8.00%	43.80%	81.30%	25.00%
Girls 12–15	23	39.10%	69.60%	0.00%	35.00%	85.00%	5.00%	14.30%	57.10%	35.70%

Percentage of exposure to visitor journeys by road/traffic type			
Percentage exposure by road type	**Country**		
	GB	**NL**	**France**
	%	%	%
Main through-road	9	5	7
Local distributor road	7	10	41
Local residential road	60	55	20
Cul-de-sac	21	8	23
Percentage exposure time by volume of traffic	**Country**		
	GB	**NL**	**France**
	%	%	%
Cars passing by only occasionally	72	76	58
Most of the time you could see 1 or 2 cars driving along the road	19	10	25
Cars passing by all the time	9	6	9
No information	*	9	8
Percentage exposure time by traffic speed	**Country**		
	GB	**NL**	**France**
	%	%	%
Faster than most traffic in towns	3	3	6
Slower than most traffic in towns	25	18	57
About the same speed as most traffic in towns	30	58	12
Percentage exposure time by type of measures to slow traffic	**Country**		
	GB	**NL**	**France**
	%	%	%
Special measures to slow down traffic	11	45	15
No special measures to slow down traffic	88	55	85
Percentage crossings by type of crossing	**Country**		
	GB	**NL**	**France**
	%	%	%
Special crossing place	86	86	62
No special crossing place	14	14	37

Child pedestrian casualties 2001 by gender, age and other factors (continued overleaf)												
	Total casualties/proportion killed or seriously injured (KSI)											
	Boys						Girls					
	5–9s		12–15s		All 5–15		5–9s		12–15s		All 5–15	
	Casualties	% KSI	Casualties	% KSI	Casualties	% KSI	Casualties	% KSI	Casualties	% KSI	Casualties	% KSI
Total *	3230	22%	3316	22%	8464	22%	1684	17%	2709	18%	5644	18%
Location on road												
At or near ped. crossing	303	22%	579	22%	1164	22%	211	18%	568	18%	1013	18%
Crossing elsewhere	2440	22%	1988	23%	5744	22%	1199	18%	1647	19%	3681	19%
On footway or refuge	121	19%	235	14%	443	14%	87	11%	201	9%	341	11%
Other carriageway locations.	267	25%	384	22%	833	23%	125	12%	207	18%	417	16%
Pedestrian movement												
Crossing road, masked by stationary vehicle	1086	24%	726	23%	2317	23%	551	19%	574	21%	1434	20%
Crossing road, not masked	1772	20%	1952	22%	4865	21%	931	17%	1716	19%	3446	18%
Stationary in carriageway	124	29%	181	27%	394	27%	43	19%	88	13%	165	15%
Walking along carriageway	30	13%	123	18%	184	18%	17	12%	66	5%	105	8%
School pupil status												
Not to/from school	2598	23%	2192	23%	6091	22%	1339	19%	1689	19%	3818	19%
On way to/from school	620	17%	1099	20%	2321	19%	329	12%	999	17%	1777	16%
Junction detail												
At or near junction	1544	21%	1826	19%	4413	20%	845	15%	1561	18%	3104	17%
Not at junction	1685	22%	1488	25%	4046	23%	838	19%	1147	19%	2538	19%

* Figures for individual sub-tables may be slightly less than the totals, due to unknown/non-applicable codes not shown.

Child pedestrian casualties 2001 by gender, age and other factors (continued)

	Total casualties/proportion killed or seriously injured (KSI)											
	Boys						Girls					
	5–9s		12–15s		All 5–15		5–9s		12–15s		All 5–15	
	Casualties	% KSI	Casualties	% KSI	Casualties	% KSI	Casualties	% KSI	Casualties	% KSI	Casualties	% KSI
Speed limit (mph)												
20	23	17%	26	23%	61	21%	6	17%	15	7%	29	14%
30	3108	21%	2975	21%	7889	21%	1613	17%	2447	17%	5228	17%
40	71	23%	209	30%	362	30%	57	12%	177	31%	289	26%
50 or 60	27	48%	97	37%	142	41%	8	25%	65	35%	92	36%
Road-class												
Major (A and motorway)	526	21%	1110	24%	2130	23%	308	17%	919	22%	1599	20%
Minor (B and unclassified)	2704	22%	2206	21%	6334	21%	1376	17%	1790	16%	4045	17%
Time of day												
Morning 0700–1200	584	16%	776	16%	1825	16%	340	11%	749	14%	1405	13%
Afternoon 1300–1800	1789	21%	1736	23%	4555	22%	928	16%	1284	18%	2922	17%
Evening/night 1800–0600	857	28%	804	26%	2084	26%	416	24%	676	24%	1317	24%
Day of the week												
Weekday	2373	21%	2729	21%	6668	21%	1288	16%	2254	17%	4562	17%
Saturday	510	23%	385	22%	1125	23%	224	20%	316	22%	679	21%
Sunday	347	24%	202	26%	671	24%	172	22%	139	20%	403	21%
Time of the year												
May–September	1655	22%	1243	21%	3672	22%	845	19%	1047	19%	2418	19%
Other months	1575	21%	2073	22%	4792	21%	839	15%	1662	18%	3226	17%

Child pedestrian casualties 2001 by gender, age and other factors (continued)												
	Total casualties/proportion killed or seriously injured (KSI)											
	Boys						Girls					
	5–9s		12–15s		All 5–15		5–9s		12–15s		All 5–15	
	Casualties	% KSI	Casualties	% KSI	Casualties	% KSI	Casualties	% KSI	Casualties	% KSI	Casualties	% KSI
Vehicles involved												
Pedal cycles	17	35%	17	24%	41	29%	9	22%	12	17%	25	16%
Motorcycles etc.	61	18%	112	22%	226	23%	50	12%	116	15%	207	15%
Cars etc.	3022	21%	3009	22%	7799	21%	1570	17%	2444	18%	5143	18%
Other larger vehicles	130	28%	178	22%	398	26%	55	24%	137	24%	269	23%
Weather conditions												
Fine, no high winds	2902	22%	2861	22%	7432	22%	1488	18%	2289	18%	4874	18%
Adverse conditions	291	21%	413	20%	927	21%	177	12%	389	20%	703	17%
Lighting conditions												
Daylight	2840	21%	2620	20%	7090	21%	1483	16%	2128	17%	4700	17%
Darkness	390	28%	696	27%	1374	26%	201	25%	581	22%	944	22%

Appendix B

A copy of the Final Summary Report from the original study

In association with:
Leeds University Institute for Transport Studies

Comparative Study of European Child Pedestrian Exposure and Accidents

Final Summary Report

Prepared for:
Department of the Environment, Transport and the Regions

March 2000

This report was prepared by MVA Ltd for the Road Safety Division of the Department of the Environment, Transport and the Regions: the views expressed in this report are those of the authors and not necessarily those of the DETR.

Contents

Executive summary

The number of child pedestrian accidents, relative to the number of children in the population, is considerably larger in Britain than the average for the EU countries. MVA Ltd, with the Institute for Transport Studies at the University of Leeds, were commissioned by the Road Safety Division of the Department of the Environment, Transport and the Regions (DETR) to make a comparative study of child pedestrian accidents in Great Britain, France and the Netherlands. This is the summary of the Final Study Report. It describes the full-scale surveys of both child exposure and accident sites in the three countries, and the analysis of the data. Its findings provide explanations for much of the differences between the countries. The Final Study Report is available from MVA Ltd (enquiries to Catherine Dekker at MVA Ltd, MVA House, Victoria Way, Woking, Surrey GU21 4DD – cost £50).

The general approach is based on the recognition that the frequency with which accidents happen is equal to the risk of an accident happening in any particular circumstances multiplied by the amount of exposure of people to those circumstances. In this case, exposure is measured by the time children spend walking in different road environments, and the number of times they cross a road in each environment. The risk associated with any defined road environment can then be estimated by dividing the number of accidents which occur in each category of road environment by the total amount of exposure to that environment or, at a more detailed level, by appropriate statistical regression analysis.

In order to measure exposure, a home interview procedure has been designed which identified all out-of-home activity of the child on the previous day, the amount and mode of travel, and then focused on a randomly selected walk stage. This walk stage was followed in great detail on a large-scale street plan, and information was collected on many aspects of the road environment, the times taken and the roads crossed. The interviewer subsequently rewalked the route, collecting still more detail about the environment, in a way which permitted the information to be categorised in a consistent way. Since the rewalked routes were selected randomly from all walk stages, and the interviews were spread across the full year, this built up a very detailed dataset which is representative of the children's walking activity. Approximately 1000 children were interviewed in each of the three countries between May 1998 and April 1999.

In parallel with the exposure survey, the same interviewers examined a representative sample of accident sites where a child was killed or seriously injured. The survey has been limited to the most severe accidents because the available data concerning the location of these sites is more complete than for less serious accidents and is more consistent between countries. The environment of the accident sites was categorised in exactly the same way as that of the rewalked stages of the exposure study, so that both exposure and accidents could be compared in a

consistent way, and be related to a wide range of relevant aspects of the roads and traffic. Approximately 500 accident sites were surveyed in each country.

The strength of this study is that it has quantified the distributions of time spent by children in proximity to roads, the number of times they cross the roads, and the number of child pedestrian accidents. It has categorised them according to the many different road environments involved, in considerable detail, and on a comparable basis between the three different countries, Britain, France and the Netherlands. Most importantly, it has provided quantitative estimates of the accident risks associated with the different environments.

It has shown that there is very little difference between the total amount of time children spend near roads in the three countries, and that children in Britain cross roads less frequently than in the other countries. Thus differences in total exposure cannot account for the higher child pedestrian accident rate found in Britain compared with the other countries. In all three countries, the accident risk was substantially greater for boys than girls, with the gap being largest for the youngest children.

Different distributions of this exposure across the different road environments do account for perhaps half of the overall difference between the countries, however. In particular, children in Britain spend more time near, and undertake more road crossing activity in, more major roads, wider roads, roads with higher flows of traffic and roads of higher speeds than children in France and the Netherlands. This is largely the result of different land use and activity patterns in Britain, and their relation to the road hierarchy. Land use and highway design and policy can be used to affect these distributions, but it is important to continue applying Urban Safety Management Techniques to major roads, and to ensure that safety education and training adequately prepare children for the dangers. The distribution of exposure across different types of road, from main roads to local roads, is very similar for different age groups and different socio-economic groups.

There are also apparent behavioural differences between British children and those in the other countries, in that British and Dutch children are more likely to use unmarked crossings than those in France, perhaps because the nearest marked crossing is closer to hand in France than in Britain or the Netherlands, and British children are more likely to cross mid-block than those in either of the other countries. Moreover, children in France are more likely to be accompanied by an adult, and those in Britain are more likely to be accompanied by other children. All of these factors could increase the accident risk in Britain relative to the other countries, though estimates of the risk do not always make a clear distinction.

The use of special measures to slow traffic (including formal traffic calming schemes) is very prevalent in the Netherlands, but is much less common in Britain or France. Estimation of their effectiveness in reducing accidents is obscured by the

fact that in Britain many of the special measures observed at accident sites had been installed following the accidents (such information was not collected from the Netherlands or France), but overall the special measures in place in the Netherlands are associated with substantially lower levels of risk than in either Britain or France, and further examination of their design and implementation may be worthwhile.

The study also suggests that in Britain road safety policy could focus on local distributor and residential roads, and road crossing activity at junctions. The higher risks identified in these areas might be the result of the design of the road environment, the behaviour of children or the behaviour of drivers, or any combination of these. Further analyses of the database might provide a better understanding of the causes, but additional research focusing on selected sites, so that specific comparisons can be made in greater detail, might also be productive.

Summary report

1 Introduction

1.1 This summary report provides a brief outline of the project's background, objectives, approach and methodology, but its main focus is on the key findings and conclusions of the study. The main report provides more details about the project's approach, methodology, sampling and analysis procedure, and the findings of the study. A full set of tabulations and survey materials are provided in the appendices of the study's Technical Report.

2 Background

2.1 Although Great Britain's overall road safety record is very good in comparison with other countries, the accident rate for child pedestrians is higher than average for the EU countries. Other northern European countries, in particular, have accident rates per child which are substantially lower.

2.2 The Road Safety Division of the Department of the Environment, Transport and the Regions (DETR) has been keen to understand the reasons for these differences in accident rates, and to identify ways of reducing accident rates in Great Britain.

2.3 Against this background, the Road Safety Division commissioned MVA Ltd and the Institute for Transport Studies at the University of Leeds to undertake a comparative study of child pedestrian accidents and exposure to risk in Great Britain, France and the Netherlands. The study, which commenced in January 1997, was completed in June 1999.

3 Objectives

3.1 The aim of this study is to understand the differences in exposure and accident rates of 5 to 15-year-olds within similar road environments and, by identifying the factors that may explain higher accident rates in Great Britain, to assess the implications for policy.

3.2 The results of this study should provide a useful basis for the development of road safety policy in Great Britain, but they will also be of value to the other countries included in the comparison. This is especially true since there are few reliable sources of exposure data currently available.

4 General approach

4.1 The study approach was built upon the following theoretical foundations.

The overall incidence of accidents in any category can be expressed as:

$$Number\ of\ accidents = Exposure \times Risk$$

where the *exposure* is some measure of the time people spend in sufficiently close proximity to road traffic to be in some danger of an accident, and *risk* measures the probability of an accident happening in that particular road environment.

4.2 The approach taken in this study was to undertake, in parallel, an exposure eurvey (measuring both the time children spent in different road and roadside environments and the number of times they crossed roads) and an accident site survey (identifying the road and roadside environments of previous child pedestrian accident sites). In this way, it was possible to match exposure and accidents within a particular environment, and by relating one to the other to estimate accident risk. Since the accident site survey is unavoidably post hoc, there is a mismatch in time between the accidents surveyed and the exposure surveys. Since for the most part road environments change only slowly, this is not thought to introduce any important uncertainty, except in the case of special measures to reduce speed where it became apparent that in a substantial fraction of cases the measures had been introduced following the accident, but prior to the site survey.

5 The exposure survey

5.1 The exposure survey measured children's exposure to different road environments using household interviews.

5.2 In each of the three countries 1000 children aged 5–15 were selected for interview. The sampling procedure developed in each country was designed to ensure that a soundly representative sample of children was selected. Particular attention was paid towards minimising the extent of bias in the sampling process with respect to socio-economic group (SEG) and the type and population density of the children's area of residence, since these factors have been suggested in previous research to be linked with differences in child accident rates.

5.3 The household interviews identified the amount of travel the child had done on the day previous to the interview, by all modes, and identified in detail all the walk stages of that travel. The study went on to examine how much walking was done in each different category of road environment, and these environments were described by a wide range of aspects. To do this, the interviewer selected at random one walk stage from the child's reported pedestrian activity and identified on a large-scale map the precise route. The interview collected much detailed information from the child (or the parent) about this particular walk, but the detail required by the study is more than the child can be expected to remember or appreciate.

5.4 In order to collect this greater level of detail, and to check on the accuracy of the information reported by the child, the interviewer then 'rewalked' the journey,

collecting information much more completely than could be obtained directly from the child. In this way the study built up an extremely comprehensive picture of a representative set of walked stages. The detail is reliable and is categorised in a consistent way because it was collected by a small number of trained interviewers.

5.5 In each country quotas were set on gender, age, social class and ethnicity in order to ensure that the profile of exposure survey respondents in each area reflected the profile of all children/households in that area. The profile of all children/households in the areas combined was very similar to the profiles of all households/children in the country. A further quota was set to ensure that the days for which children's travel patterns were recorded were representative of the actual number of days that were weekends, term-time weekdays and holiday weekdays.

5.6 Inevitably, the statistical sampling provided some differences between target and outturn, especially in relation to SEG. Consequently, where appropriate in the analysis, weighting factors were applied to ensure that the data collected truly reflected the total population of each country.

5.7 The number of interviews actually undertaken and used in the analysis in each of the three countries was 1002, 993 and 1024 in Great Britain, France and the Netherlands respectively.

6 The accident site survey

6.1 The accident site survey examined the sites of a representative sample of accidents where a child pedestrian was killed or seriously injured. This selection ensured that the accidents and sites were recorded fairly accurately, which is not always the case for slight injuries.

6.2 In each of the three countries, national datasets were obtained for accidents where pedestrians aged between 5 and 15 had been killed or seriously injured. From the information acquired, a sample of 500 accidents were selected in each country for the survey. All accidents resulting in death were selected, and the remainder were selected from those resulting in serious injury. The number selected from each region was proportional to the number of accidents that had occurred in that region, but within the region accidents were selected at random.

6.3 The site surveyors were provided with detailed descriptions of each accident, including their location. The surveyors were required to visit the accident site and to collect the same range and detail of information on road and roadside environment of all the roads within 20 metres of the accident site as was collected for the walks undertaken by the children in the exposure survey.

6.4 Five hundred accident site surveys were conducted and used for analysis in Great Britain. The corresponding figures in France and the Netherlands were 499 and 493 respectively.

7 The analysis

7.1 The surveys have provided a very rich dataset of exposure times, road crossing activities and accidents within comparable descriptions of many aspects of the road environment. This will be a fruitful source for future research into the many aspects of child pedestrian accidents, but the analysis described here focuses on explaining why the accident rates in Britain are higher than those in France and the Netherlands. The full study report contains details of many aspects which differ between the countries, and which have relevance to understanding those factors which affect road safety in the different countries and which have some bearing on policy. In this short report, only the most important findings are described.

7.2 Much of the analysis depends upon comparisons of:

- the percentages of ***total time exposure***, or of the percentage of ***road crossing activities***, within the various categories of road environment;
- the percentages of ***accidents*** occurring within those same categories; and
- estimates of the ***relative risk*** of each environment in each country, obtained as the ratio of the percentage of accidents to the percentage of exposure, and normalised to the smoothed fatal accident rate in each country (fatalities being used as the most comparable descriptors of safety between countries), taken to be 1.39 fatalities per 100,000 children in Britain, 0.82 in France, and 0.54 in the Netherlands.

7.3 The average risks for the different environments, estimated across all three countries, have also been used to estimate the accident rates which would be expected in each country if the observed distributions of exposure occurred at this average risk. Comparison of this expected accident rate with the actual rate provides a measure of what proportion of the differences in overall accident rate between the countries can be explained solely by differences in the distribution of exposure. Bar charts are given in what follows to illustrate some of the conclusions drawn, but in the interests of brevity only selected aspects are shown. Consequently, not all the percentages of exposure and accidents add up to 100% because some categories are omitted. The full tabulations and qualifications are given in the full study report.

8 The findings

8.1 Introduction

8.1.1 The original proposal for this study suggested that the possible outcomes might fall into three separate categories with rather different policy implications. These were:

- that the differences in overall accident risks between the three countries are due to differences in the ***total amount of pedestrian exposure***;
- that the differences are due to the ***exposure being distributed differently***, so that in some countries more exposure is in road environments with a higher accident risk – in some aspects these differences of distribution may be the result of the spatial distribution of children's activities in relation to the road network, while in others they may be due to differences in the children's behaviour; and
- within similar road environments, ***the risk for a given amount of exposure*** is higher in some countries than others, so that, other things being equal, an aspect of the road appears less safe, perhaps because the physical design is different or it is used differently by either the children or motorists.

8.1.2 The main findings of the study are discussed within each of these separate categories of outcome.

8.2 Total pedestrian exposure

8.2.1 As Table 1 shows, the total time spent near roads is very similar in all three countries, with the average daily pedestrian exposure in Britain slightly smaller than that in France or the Netherlands. Children in Britain also make substantially fewer road crossing activities than in the other countries. Thus differences in total exposure cannot explain the higher overall accident rate in Britain.

Table B1: Mean exposure per person

	Great Britain	Netherlands	France
Time (minutes)			
Foot/rollerblade	25.93	26.40	27.82
Bicycle	2.31	17.89	3.46
Foot and bicycle	28.24	44.27	31.29
Number of times roads were crossed			
(per day)	4.98	8.56	6.74
Number of people	1002	1024	993

8.2.2 In passing, it might be noted that children in the Netherlands spend substantially more time cycling than those in Britain or France, but this seems to be in addition to time spent walking and not a substitute for it. This extra time is compensated only marginally by less time spent on public transport or in cars, and leads to an average total daily travel time which is substantially higher in the Netherlands than in either Britain or France. In Britain, the total time spent per day near roads was greater in cities than in towns or rural areas, but this trend was less clear in France and the relevant categorisation was not available in the Netherlands. British children spend less exposure in the dark or dusk than do children in France or the Netherlands.

8.2.3 The differences in exposure between age groups are relatively small, with an upward trend with age in Britain, and slight downward trends in France and the Netherlands. However, the accident risk per unit of exposure is substantially greater for boys than for girls, by a factor of two or more for younger children, though the gap narrows for older children.

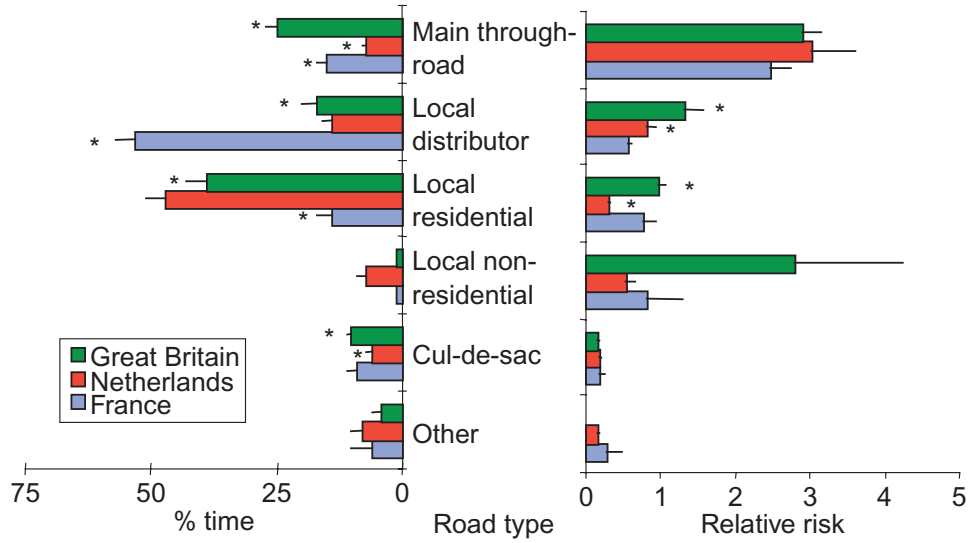
8.3 Distribution of exposure: infrastructure and traffic characteristics

8.3.1 Although the total exposure in each country cannot explain the higher accident rate in Britain, it is distributed very differently across some of the many categories of road environment identified in the surveys. Some of these differences in distribution help to explain much of the difference in accident rates. The aspects offering greatest explanation are listed below.

The type of road

8.3.2 Figure B1 shows that there is a clear reduction of accident risk down the road hierarchy for road crossing activity, with main through-roads associated with a risk several times that for more local roads. The picture is very similar for time exposure. Children in Britain spend substantially more time on main roads than in the other countries, with most of the exposure in France being on local distributor roads, and almost half of the exposure in the Netherlands (and over half the road crossing activity) being on residential roads. These differences in the distribution of exposure across the different types of road seem to explain about 40% of the observed differences in overall accident rates between Britain and the Netherlands, and 30% of the difference between Britain and France.

Figure B1 Time exposure: percentage exposure and relative risk categorised by road type



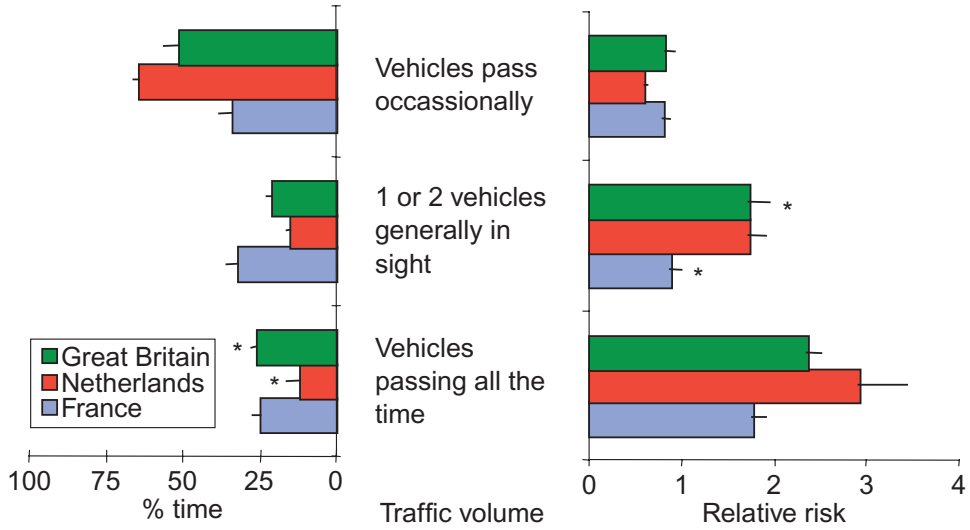
Standard deviations indicated by the line extending from the ends of each bar. Askerisks indicate where the value for Great Britain differs from that for the other countries by more than twice the sum of standard deviations (i.e. ~5% level of significance).

8.3.3 In Britain there is relatively little difference in the patterns of exposure by road type of children in different age groups, or of boys and girls. In France, younger children spend only half the time on main roads that older children spend, but with four times the risk, and in the Netherlands a markedly high overall risk on main roads is primarily related to the higher accident risks of males in all age groups. There is very little difference between SEGs in their distribution of exposure across the different road types.

Traffic volume

8.3.4 It was not possible to make traffic counts, but the surveyors were trained to make consistent categorisations of traffic flows into light, medium or heavy. Figure B2 shows that, for road crossing activity, the estimated accident risks increase consistently with traffic volume: the increase is probably much less rapid than pro rata, perhaps because children are more aware of accident risks where traffic is heavier. The picture is very similar for time exposure. The risks in each category of road in Britain are not significantly greater then those in the other countries. The greater exposure of British children to higher traffic volumes than in the Netherlands explains about a fifth of the difference in overall accident rates between these countries, but not the differences relative to France.

Figure B2 Time exposure: percentage exposure and relative risk categorised by traffic volume

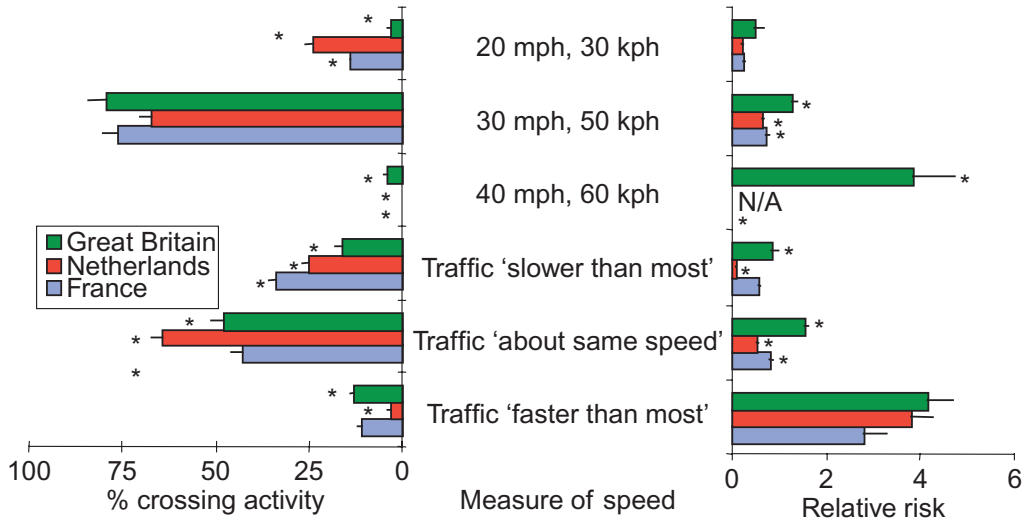


Standard deviations indicated by the line extending from the ends of each bar. Askerisks indicate where the value for Great Britain differs from that for the other countries by more than twice the sum of standard deviations (i.e. ~5% level of significance).

Traffic speed

8.3.5 In the surveys, speed could only be measured by the prevailing speed limit or by a qualitative judgement of speed relative to that 'normal' in towns. Figure B3 shows that, for time exposure, accident risks calculated from the survey data generally increase in a consistent way with both measures of speed. The picture is very similar for crossing activity. Overall, and including some estimates at speed limits not included in Figure B3, risk increased more rapidly than pro rata with speed. Children in France and the Netherlands spend a larger proportion of their exposure in speed limits less than the standard urban limit of 30 mph/50 kph, and on roads where traffic is judged to be 'slower' than normal, than do children in Britain. These differences in exposure time explain 17–30% of the difference in the overall accident rate relative to the Netherlands (for assessed speed and speed limits respectively), and 15–40% relative to France. For road crossing exposure, the observed distributions explain 25–20% of the difference with the Netherlands, and 25–40% of the difference with France.

Figure B3 Crossing exposure: per cent of crossings and relative risk categorised by traffic speed



Standard deviations indicated by the line extending from the ends of each bar. Askerisks indicate where the value for Great Britain differs from that for the other countries by more than twice the sum of standard deviations (i.e. ~5% level of significance).

Infrastructure and traffic characteristics in combination

8.3.6 Road type and traffic volume, and to some extent traffic speed, are strongly interconnected. In Britain, children spend more time on main roads, and therefore they are likely to be exposed to higher flows of traffic, and perhaps faster traffic. The study also examined the effects of road width and the number of lanes, and showed the expected increase of risk with road width. The distribution of exposure across the different types of road is related to the spatial layout of the road network and its hierarchy, and to the built environment around it, especially in relation to housing but also in relation to the children's destinations, such as schools, shops, recreational areas etc.

8.3.7 The activity patterns are strongly influenced by land-use development practices and policies, and it is not clear that road safety policy can have much direct affect on this distribution of activity. Even so the risks can be reduced. It will be productive to ensure that road safety education in Britain places suitable emphasis on the dangers of main roads and encourages appropriate behaviour in proximity to heavy flows of traffic. Highway design and engineering measures to channel traffic away from pedestrians as much as possible have proved to be effective in reducing accidents in previous urban safety studies, and Urban Safety Management Techniques[4] have been developed which can reduce the risk in these road environments very substantially. Consideration of the road safety policy in these areas could perhaps

[4] See Institute of Highways and Transport (1990). *Guidelines on Urban Safety Management*.

move Britain closer to the distributions of exposure found in the other countries. It might be argued that France, with its relatively low overall population density, has more scope than Britain to keep its major roads separate from development that generates or attracts child pedestrians, but this argument is clearly not applicable to the Netherlands, which manages to keep a larger part of child pedestrian activity lower in the road hierarchy. Moreover, it is also clear that lower speed limits apply to a greater proportion of child exposure in France and the Netherlands than in Britain.

8.3.8 Both of the following factors:

- the spatial relation of major roads to housing; and
- speed limits in residential areas

merit policy consideration. Also, in relation to speed, it should be noted that half of the exposure in the Netherlands is in the presence of special measures to reduce speed (including various aspects of traffic calming), compared with only 10–15% for Britain and France. This will be discussed later in this report.

8.3.9 Statistically, road type, traffic volume, speed limit and road width (which has also been examined in the study and which shows increasing risk with width) are all intercorrelated. Consequently, it is not possible to say with any precision what fraction of the observed differences in overall accident rate between the countries can be explained by the different distributions of exposure across all the categories of environment taken together. Moreover, the calculation of 'expected accident rates' is based on the assumption that a given type of environment carries the same risk in all countries, when in practice there is a tendency for situations which are less safe to carry a relatively lower risk per unit of exposure in those countries where children are most exposed to them. For this reason, the calculation of the 'expected accident rate' is likely to overestimate the extent to which any single aspect might explain the overall differences between the countries. Nevertheless, it seems likely that, collectively, the different distributions of exposure could explain about half of the observed differences in accident rate between Britain and both the Netherlands and France.

8.4 Distribution of exposure: behaviour

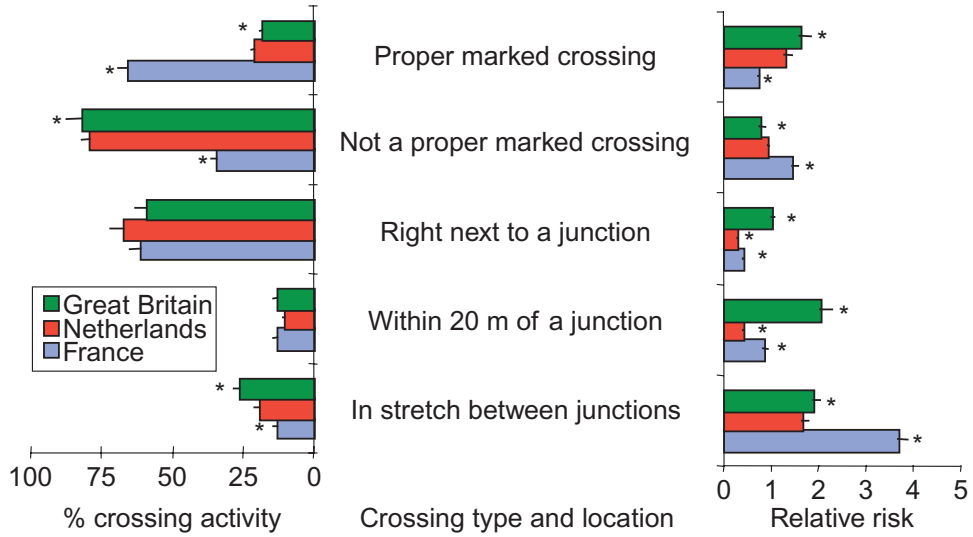
8.4.1 The differences between the countries noted in Section 8.3 are related primarily to the differences in activity patterns, land-use patterns and the road hierarchy. Other differences in the distribution of exposure between the countries seem to be related more to the differences in child pedestrian behaviour than to their activities that are taking place in different types of road environment. These aspects might provide productive targets for education and training:

Crossing places

8.4.2 Figure B4 shows that:

- British and Dutch children more frequently cross the road at a place where there is no marked crossing than at a designated crossing, whereas French children more frequently cross at marked crossings; and
- children in Britain are more likely than children in the other countries to cross between junctions.

Figure B4 Percentage of crossing activity and relative risk categorised by the use of marked or unmarked crossings and by nearness to a junction



Standard deviations indicated by the line extending from the ends of each bar. Askerisks indicate where the value for Great Britain differs from that for the other countries by more than twice the sum of standard deviations (i.e. ~5% level of significance).

8.4.3 However, crossing the road without using a marked crossing appears to be associated with a lower risk than the use of properly marked crossings in Britain, perhaps because they occur mostly on safer stretches of road. The Netherlands show a similar effect overall, but this disappears when crossing activities are disaggregated by road type and in most individual road types crossings made at places without a marked crossing carry the higher risk, whereas the effect persists in Britain in all except the main roads. Moreover, much of the use of the unmarked crossings in the Netherlands is in the protected residential areas. Crossing activity at a junction carries the least risk in all countries, so the higher proportion of mid-block crossing in Britain may be cause for policy concern. Crossing activity at or near junctions is associated with a much higher risk, absolutely and relatively, in Britain than in the other countries, though for crossing activities between junctions it is France which shows the highest risk. Taking the calculation of 'expected accident rates' based on average risks, these differences in crossing activity explain only 12%

of the difference between Britain and the Netherlands, but 55% of the difference with France.

8.4.4 The risk of crossing the road is generally higher for boys than girls, and in Britain and France the risks are greater in the higher age groups. In Britain, the lower SEGs are more likely to use marked crossings than the higher groups, possibly because their environment provides a higher frequency of marked crossings.

Accompaniment

8.4.5 French children are more likely to be accompanied by someone over 16 when crossing the road, while British children are more likely to be accompanied by other children. Without comparable accident data it is not possible to say whether this reduces the risk in France or increases it in Britain, but it offers some potential explanation.

8.5 Design of the road environment

8.5.1 After taking account of the differences in distribution of exposure noted in Sections 8.3 and 8.4, the estimates of risk obtained by comparing the categorisations of accidents and exposure indicate a number of road environments which might be intrinsically less safe in Britain than in the other countries. The examination of the design of these environments might prove productive. However, these conclusions should be treated with caution, since in any given environment it is not possible to say whether a higher risk is due to:

- the less safe design of the physical surroundings;
- the less safe behaviour by child pedestrians in that environment; or
- the less safe behaviour by motorists in that environment.

8.5.2 The most important differences in unit risk (i.e. per minute of exposure or per road crossed) are described below.

Road type

8.5.3 Main roads in Britain do not seem to be inherently less safe than those in the other countries, but local distributor and residential roads might carry an intrinsically higher risk, as shown in Figure B1.

Special measures to reduce speed

8.5.4 Figure B3 has already indicated the rapid increase in accident risk with traffic speed. The study collected information on the presence of ‘special measures’ aimed at reducing traffic speed: these included the usual components of traffic calming, such

as road humps, road narrowings, chicanes and different road surfaces, but they also covered speed cameras and other aspects which were not necessarily elements of formal traffic calming. However, quantitative analysis to estimate risk was complicated by the discovery that, in Britain, some 40% of the special measures surveyed at accident sites had been introduced since the accident. This information was not available from the other countries, so that a like-for-like comparison could not be made.

8.5.5 The study found that special measures were present for a very much larger proportion of both time and crossings exposure in the Netherlands than in either Britain or France; for Dutch children, about half of their exposure is in the presence of some sort of special measure, while in Britain and France the proportion is about 15% for time exposure and 10% for crossing exposure. Moreover, the use of several individual measures such as road humps, different road surfaces and artificial chicanes (though the latter are not near marked crossings) is significantly higher in the Netherlands – in particular, humps and surfaces are used extensively.

8.5.6 The estimated risks on roads with special measures were found to be significantly lower in the Netherlands than in Britain and France, at 0.31, 2.13 and 0.88 respectively for time exposure, and 0.32, 3.20 and 1.12 for crossing activity. However, as noted above, these estimates should be corrected for the sites where the special measures were introduced after the accident. In Britain, this correction reduces the estimated risk to 1.2 and 1.8 for time and crossings exposure respectively: it was not possible to make the same correction for the other countries, where it would also reduce the estimated risk, but given the wide application of special measures in the Netherlands it seems likely that the reduction would be relatively smaller there. Even so, the risk in the Netherlands would remain significantly lower than in either Britain or France, and further examination of the design and application of the measures there might be helpful.

8.5.7 It seems likely that the prevalence of special measures in the Netherlands accounts for a substantial part of the difference in overall child pedestrian accident rates between the countries. If special measures in the Netherlands had carried the same risk as normal roads, the accident rate there would be increased by about 45%, bridging about a third of the gap with Britain and closing the gap with France.

Crossing activity

8.5.8 As noted in Section 8.4 above, British children crossing the road at or near to a junction (i.e. within 20 metres) appear to carry a higher risk than those in the other countries, but categorisation by crossing type does not suggest that particular types of British crossing are less safe than their foreign counterparts. Uncontrolled zebra crossings seem to be associated with a higher risk in Britain than elsewhere, but they account for only a few per cent of all child crossing activities and they are in any case less likely to be at junctions. British traffic signals with a pedestrian-called

phase seem to carry less risk than their foreign counterparts. Marked crossing places on more local roads are associated with higher risks than when children cross at places without a proper marked crossing, and the risks are substantially higher than in the other countries, so that closer examination of how children use these crossings seems justified. There seems to be no consistent relationship between poor visibility at crossing places and increased risk, and in any case there is little difference between the countries in visibility at crossing places.

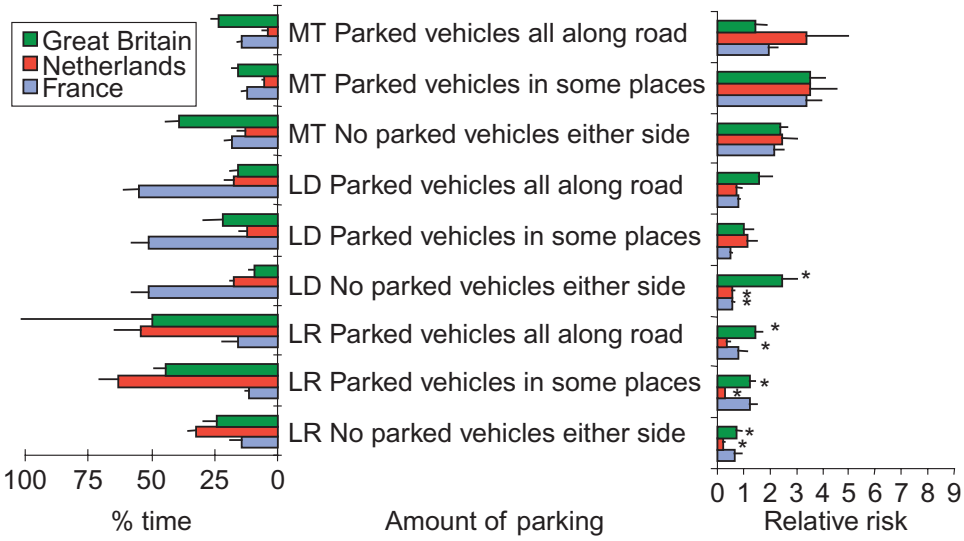
Footways

8.5.9 The estimated risk decreases with the width of the footway alongside a road, from typically over 1 for footways less than 1 metre wide to around half this for footways over 2 metres. Footways tend to be wider in the Netherlands, and this will reduce the risk marginally there but, overall, the differences in the physical attributes of footways offer no appreciable explanation of the differences in overall accident rates between the countries. Exposure in the Netherlands is much more likely to be with some form of barrier present between the footway and the road than in the other countries, but the commonest form of raised barrier there is associated with a relatively high risk. In Britain, verges with trees are associated with a higher risk than verges without trees. The absence of a footpath or footway separate from the road is associated with substantially higher risk in Britain and the Netherlands, though not in France, but there is much less exposure on British roads without a footway than in either France or the Netherlands. The effect of footways is, in any case, likely to be confused with differences between urban and rural conditions.

Parked vehicles

8.5.10 Parked vehicles along the side of a road are generally considered to be a safety hazard. However, overall, the estimated risk in environments with many parked vehicles is actually lower than in areas with few parked vehicles in both Britain and France. This is, though, largely an artefact of the distribution of exposure across different types of road, since the more dangerous main roads tend to have less parking than more local roads. When exposure time is disaggregated by both parking and road type, as in Figure B5, there is no very consistent relationship between risk and the amount of parking on most road types. Even so, Britain shows a statistically significant increase in risk when there are no parked vehicles than when there are many in both main through-roads and local distributors. France shows a lower risk associated with frequently parked vehicles than with few parked vehicles in the most important road types, though the trends across the road types are not consistent. In the Netherlands, the tendency is for risk to increase with the amount of parking, but the standard deviations are large and the trends are not statistically significant. Risks on all the road types with little parking are significantly higher in Britain than elsewhere, and risks on residential roads are significantly less in the Netherlands than in Britain at all levels of parking. Thus, overall, the effect of parked vehicles remains unclear, but the differences in

Figure B5 Time exposure: percentage exposure and relative risk categorised by the number of parked vehicles and road type



Key: MT – main through-road; LD – local distributor; LR – local residential

Standard deviations indicated by the line extending from the ends of each bar. Askerisks indicate where the value for Great Britain differs from that for the other countries by more than twice the sum of standard deviations (i.e. ~5% level of significance).

exposure to parking are similar in the different countries, and do not account for any of the observed differences in accident rates.

Priority lanes

8.5.11 Potentially, the presence of special lanes might increase the accident risk because of children's unfamiliarity with them and the greater complexity of the road layout, but they are more common in the Netherlands and, especially, France than in Britain. They are associated with substantially higher accident risks in the Netherlands, but not in France. They do not explain any of the difference between Britain and the other countries.

The built environment

8.5.12 In Britain, greater risk is associated with houses close to the road and with apartment blocks. This may be primarily the effect of correlations with socio-economic aspects of the children concerned, but it is absent in France and the risk is much reduced in the Netherlands. Houses in France are much more likely to be close to the footpath than in Britain or the Netherlands, and apartment blocks are more prevalent, so this may be the effect of greater familiarity with the dangers, and/or less correlation between socio-economic status and these categorisations of housing. There is a higher risk associated with shops in Britain, but not in the other

two countries. Overall, differences in the distribution of exposure between different categories of the built environment do not provide any explanation of the differences in the overall accident rates between the countries.

8.6 Regression analysis

8.6.1 The analysis of risk described above has proved very fruitful, but it is limited to the consideration of each aspect in turn, or at best cross-categorisation into two or three dimensions, and cannot handle combinations of variables which are strongly correlated, as for example in the strong linkage between road type, traffic flow, speed and carriageway width. The study attempted to distinguish the separate effects of related variables by estimating a variety of logarithmic regression models on the exposure data, treating accidents as the independent variable to be explained by combinations of the exposure variables in both step-wise and forced regressions. Overall, the regression models gave rather mixed results and were able to add little to the findings of the risk analysis. They suffer from the overriding disadvantage that, in treating the area-wide accident rate as the dependent variable, they are obliged to discard half the available data by omitting the survey categorisation of the sample of accident sites. Much of the variation in accident rates between the areas used as a basis for averaging both accident and exposure data seems to be due to geographical factors outside the range of variables assessed in the surveys.

8.6.2 In general, though, the coefficients of the models lent support to the pattern of risk estimated in the previous sections. The strongest relationship tends to be between accident rate and traffic volume, and secondary to this the risk also increases with higher positions in the road hierarchy. The analysis suggests that the accident risk increases with the number of parked vehicles, and reduces with pavement width and with the nearness of a crossing place to a junction. The increased risk with parked vehicles is perhaps clearer here than in the risk analysis, though there it was confused with road type and disaggregation showed the same correlation in most individual road types. The variation with pavement width and proximity to a junction supports the findings of the risk analysis. The full results are given in the full Study Report.

9 Conclusions

9.1 The strength of this study is that it has quantified the distributions of time spent by children in proximity to roads, the number of times they cross the roads, and the numbers of child pedestrian accidents. It has categorised them in considerable detail according to the many different road environments involved and on a comparable basis between the three different countries, Britain, France and the Netherlands. Most importantly, it has provided quantitative estimates of the accident risks associated with the different environments.

9.2 It has shown that there is very little difference between the total amount of time children spend near roads in the three countries, and that children in Britain cross roads less frequently than in the other countries. Thus differences in total exposure cannot account for the higher child pedestrian accident rate found in Britain compared with the other countries.

9.3 Different distributions of this exposure across the different road environments do account for perhaps half of the overall difference between the countries, however. In particular, children in Britain spend more time near, and make more crossings of, more major roads, wider roads, roads with higher flows of traffic and at higher speeds than children in France and the Netherlands. This is largely the result of different land use and activity patterns in Britain, and their relation to the road hierarchy. Land use and highway design and policy can be used to affect these distributions.

9.4 There are also apparent behavioural differences between British children and those in the other countries, in that British children are much more likely to cross the road without using a properly marked crossing place than those in France, and they are more likely to cross the road mid-block than those in either of the other countries. Moreover, children in France are more likely to be accompanied by an adult, and those in Britain by other children. All these factors could increase the accident risk in Britain relative to the other countries, though estimates of the risk do not always make a clear distinction.

9.5 Traffic calming and the use of special measures to slow traffic are much more prevalent in the Netherlands than in Britain or France, and may account for a third of the difference in accident rates between the Netherlands and Britain. The measures in place in the Netherlands also seem to be associated with substantially lower accident risks than in Britain and more detailed comparison of the approaches used in the two countries may be productive. The study also suggests that in Britain road safety policy should focus on local distributor and residential roads, and children crossing the road at or near to junctions, where the estimated risks per unit of exposure seem significantly higher in Britain than in the other countries. However, children in Britain spend a much larger fraction of their exposure on main roads, and although these are associated with no higher risk than in the other countries, it is obviously sensible to make them a target for education and training programmes.

Appendix C

Copies of the exposure study and accident site questionnaires

FORM 1	ONE DAY ACTIVITY DIARY (GB)	Serial No:					

Q1 What is your name? (Write first name only)				
Q2 How old are you? (Write in years)				
Q3 What month is your birthday in? (Write in month)				
EXPLAIN FORM 1 USING 'EXPLANATION OF QUESTIONNAIRE FORMS' PAGE				
Stage number: (Ring together all stages in the same trip)	1	2	3	4
Q4 Where did you start this trip/playing? (Prompt for address or as near as possible. Use H for Home)				
Q5 Where did you finish this trip/playing? (Prompt for address or as near as possible. Use for H Home)				
Q6 How did you make this trip/were you playing? (Prompt as necessary.) (One code only) 1 foot5 bus 2 roller blade/skate6 train 3 bicycle 7 other (specify) 4 car				
Q7 What was the main reason for this trip? (Prompt as necessary.) 1 to school4 playing/hanging about the streets 2 from school5 to/from the car 3 to/from visiting friends6 to/from other (specify)				
Q8 What time did you set out? (Best estimate)				
Q9 How long did the journey take/were you out playing? (Circle minutes/seconds as applicable)	m/s	m/s	m/s	m/s
CONTINUE IF TRIP/PLAY IS ON FOOT OR ROLLER BLADE/SKATE ONLY, OTHERWISE GO TO NEXT STAGE.				
Q10 How much of this time were you walking on a footpath or pavement which goes alongside or near to a road, or on the road itself? 1 all 3 none 2 some (If some, estimate time in brackets. Specify minutes (m) or seconds (s))				
CONTINUE IF AT LEAST SOME OF THE TRIP/PLAY WAS ALONGSIDE OR ALONG A ROAD, OTHERWISE GO TO NEXT STAGE				
Q11 Were you **(1) alone** **(2) with other(s) (all under 16 years)** (Write in age of oldest in group in brackets) **(3) with other(s) (at least 1 aged 16+)** (If accompaniment changes, multicode, and write estimated percentage of time for each category in brackets beside the code)				
Q12 When you made this trip/were playing was it light or dark outside, or somewhere in between? 1 light 2 dawn/dusk 3 dark				
Q13 Was it: (Multicode) 1 raining 3 foggy/misty; 2 snowing; 4 none of these				

i1 What day of the week does Form One apply to (**excluding** columns re-labelled 77 or 88) ie what day of the week was the day prior to the interview? _____

i2 Was this day a:

weekday during the term time	1
weekday during the school holidays/a bank or national holiday	2
weekend	3

i3 Was the walk stage selected for Form 2 on the same day as the other stages described on Form 1, or did you need to probe to previous days as well, and re-label one of the columns 77 or 88?

Same day as other stages	1	Go to Form 2
Previous day to other stages	2	Continue

i4 How many days ago was the selected walk stage labelled 77 or 88 undertaken?

_____

i5 What day of the week was it undertaken on? _____

i6 Was this day a:

weekday during the term time	1
weekday during the school holidays/a bank or national holiday	2
weekend	3

i7 Was the reason the selected walk stage was different to other stages described on Form 1 because:

No suitable walk stages to/from home were undertaken on that day	1
Walk stages undertaken were not with the adult present and respondent/adult were unable to explain route taken	2
Other (specify)_____	3

Page No:		

FORM 2a	DETAILS OF SELECTED TRIP/WALK STAGE OF A TRIP - ALONGSIDE ROADS (GB)	Serial No:					
		Stage No (i1):					
		Section No:					

COMMENCE WITH EXPLANATION OF FORM FROM 'EXPLANATION OF QUESTIONNAIRE FORMS' PAGE

....

		Interview	Rewalk
i8a	Description of where section commences:_____		X
i8b	Description of where section finishes:_____		X
i9	Name of road/car park/park/path etc:_____		X

Q14 **How long does it take to walk along this bit, from ... to ....? ....**_____mins_____mins
....**_____**secs_____secs

(R1a)

IF THIS SECTION IS NOT ON OR ALONGSIDE A ROAD (EITHER ON A FOOTPATH OR PAVEMENT OR ON NO PATH), STOP HERE AND GO TO NEXT SECTION.

IF THIS SECTION IS *NOT THE SAME* ROAD AS THE ROAD ON THE PREVIOUS FORM 2A, GO TO Q17.
IF THIS SECTION IS *THE SAME* ROAD AS THE ROAD ON THE PREVIOUS FORM 2A, ASK Q15 AND Q16.

Q15 **Is there any change in the amount of traffic, or amount of parked cars from the last section of this road you described?**

Yes 1		X
No 2		X

Q16 **Is there any change from the last section of this road in who you were with or the speed you walked/how you were playing/what you were doing?**

Yes 1		X
No 2		X

IF Q15 AND Q16 ARE BOTH 'NO', SKIP TO NEXT SECTION, AND COPY RESPONSES FOR Q17 TO Q21 FROM PREVIOUS SECTIONS FORM AFTER THE INTERVIEW

Q17 **Along this bit of road were you walking, standing around and chatting, or playing?**
(If walking, prompt further for faster, slower or same speed as normal)

Walking faster than normal/running 1		X
Walking at a normal speed 2		X
Walking slower than normal 3		X
Standing around/chatting 4		X
Playing (specify activity)_____ 5		X

Q18 **Were you walking/playing** (read as appropriate) (multicode)

on the pavement/footpath 1		X
on the road 2		X
on the hard shoulder 3		X

Q19 **Along this bit of road, would you say that yesterday** (SHOWCARD A)

(R1b) **cars were passing by only occasionally or not at all** 1	....	1
most of the time you could see 1 or 2 cars driving along on the road, or 2	....	2
there were cars passing by all the time? 3	....	3

Q20 **Along this bit of the road, on the side of the road which you were walking**
(R2) **along, were there** (SHOWCARD B)

parked cars all along road 1	....	1
parked cars in some places, but with long spaces in between or 2	....	2
no parked cars at all? 3	....	3

ONLY ASK Q21 IF ACCOMPANIMENT CHANGES ALONG THE TRIP. OTHERWISE FILL IN Q21 WITHOUT ASKING.

Q21 **Along this bit of the road were you**

alone 1	....	X
with other(s) (all under 16 years) (Write in age of oldest_____**)** 2	....	X
with other(s) (at least one aged 16+) 3	....	X

(If this changes within this section, write in the code which applies to the longest bit of the section)

OBSERVATIONS FOR REWALK ONLY

(R3)Speed limit: (If unsure, estimate and circle 'E')_____ E

(R4)Traffic speed

faster than most traffic in towns 1
slower than most traffic in towns, ... 2
about the same speed as most traffic in towns 3
unable to respond because no traffic at all 4

(R5) Bus/Cycle/Tram Lanes (multicode any applicable)

bus lane in one direction 1
bus lanes in two directions 2
cycle lanes in one direction 3
cycle lanes in two directions 4
tram lanes in one direction 5
tram lanes in two directions 6

(R6)Lanes available for cars (exclude bus/tram lanes)

Small road not wide 1
enough for 1 lane in each direction 2
One lane for each direction 2
2+ lanes for each direction 3
One way road with one lane 4
One way road with 2+ lanes 5

(R7)Special measure to control speed: (multicode if applicable) (SHOWCARD G)

No special measures 1
Road humps/obstacles in road to slow ..... down traffic 2
Speed cameras 3
Artificial curves in road designed to slow traffic 4
Road narrowing to provide pedestrian islands, with parking bays, designed to slow traffic 5
Different types of road surfacing in some places eg bituminous, brick, paving etc 6
Other things to slow traffic – specify_____ 7
..... _____

(R8) Path type (see interviewer instructions for definitions)

Pavement 1
Footpath 2
Other (specify_____) 3
No path (ie on the road itself) 4

(R9) Barriers (fences/railing) between road and footpath/pavement where walked (SHOWCARD H) (Multicode)

Railing between road & path/pavement 1
Other raised barrier between road & path ..... (specify) _____ 2
Bank between road and footpath 3
Verge/space between road and path without trees 4
Verge/space between road and path with trees 5
None of these 6

(R10) If R9 = 3, 4 or 5, estimate width, ie distance between road and path_____ m

(R11) Width of pavement (If this changes, code the width of longest bit of pavement)

less than 1M 1
1M - 2M 2
more than 2M 3

(R12) Type of buildings: (Multicode where necessary)

Houses with own driveways 1
Houses without own driveways 2
Blocks of flats 3
Shops 4
Other buildings (eg industrial/ service - specify) 5
No buildings (eg rural/wasteland/ courtyard/carpark) 6

(R13) Distance of buildings from pavement (Multicode where necessary) (SHOWCARD I)

Buildings right next to pavement 1
Buildings separated from pavement by very small ..... garden/courtyard, ie distance from building to pavement is approximately the length of 1 ..... parked car or less 2
Buildings separated from pavement by big garden/courtyard, ie distance from building to pavement is approximately more than the length of 1 car 3
No buildings 4

(R14) Road Type (If unsure, code your best guess and circle 'E' for estimate)

Main through route ... . 1 – E
Local distributor road ..... 2 – E
Local residential road (not cul de sac) ..... 3 – E
Local non residential road (not cul de sac) ..... 4 – E
Cul-de-Sac ..... 5 - E
Pedestrianised road with some vehicle access ..... 6 - E
Access road ..... 7 - E

(R15) Number of multi-use driveways and access roads crossed Keep tally for each stage_____

OBSERVATIONS FOR REWALK ONLY

FORM 2b	DETAILS OF A SELECTED TRIP WALK STAGE OF A TRIP - CROSSINGS (GB)	Serial No:					
		Stage No (i1):					
		Section No:					

Interview Rewalk

(i10) Name of road crossed_____ X

Q22 (R16) **Would you say that yesterday the road which you crossed had** (SHOWCARD A)

- **Cars passing along it only occasionally, or not at all** 1
- **1 or 2 cars driving along the road, or** 2
- **Cars passing by all the time?** 3

Q23 (R17) **Was the place you crossed the road** (SHOWCARD C)

- **On/right next to a junction** (CONTINUE) 1
- **Near a road junction (within 20m ie length of 6 cars parked in a row with no spaces at all in between them)** (CONTINUE) 2
- **Along a stretch of road between road junctions (more than 20m from junction)** (GO TO Q25) 3

Q24 (R18) **Can you show me the type of junction?** (SHOWCARD D)

- **T junction minor arm (on the road coming into another road)** 1
- **T junction major arm (the road with another road coming into it)** 2
- **A crossroad (both roads the same size)** 3
- **A crossroad (on the bigger of the two roads)** 4
- **A crossroad (on the smaller of the two roads)** 5
- **A roundabout (could not drive over)** 6
- **A mini roundabout (could drive over)** 7
- **On another type of junction (specify, eg staggered junction, Y junction, slip road, multiple junction)** 8
- **Across a car park** 9

Q25 (R19) **Was the place you crossed at a special place for crossing, such as** (multicode) (SHOWCARD E)

- **A Zebra crossing** 1
- **Traffic lights with button for red and green man** 2
- **Traffic lights without button for red and green man** 3
- **Someone to help you cross eg police, lollipop person** 4
- **Island in the road especially for people crossing the road** 5
- **Footbridge or subway** 6
- **Some other type of marked crossing - (specify)** 7
- **Island in the road but not designed especially for people crossing the road** 8
- **Not a marked crossing** 9

NOW GO TO Q29, UNLESS Q25 IS '8' OR '9'

Q26 **Was there a marked crossing further along the road?**

- **Yes** (CONTINUE) 1
- **No** (GO TO Q29) 2

Q27 **Why didn't you walk to the marked crossing?**

- **Too far** ..... 1 X

Other (specify) _____ 2 X

Q28 (R20) **How long would it have taken you to walk to a special crossing point on that road?** mins secs mins secs

Q29 **Were there any parked cars making it difficult to see if there were any cars coming?** (Write in all applicable codes)

- **Parked cars obstructing view** ..... 1 X
- **No parked cars obstructing view** ..... 2 X
- **Don't know** ..... 3 X

Q30 **When you crossed the road were you**

- **Alone** ..... 1 X
- **With other(s)** (all under 16 years) (write in age of oldest)_____ 2 X
- **With other(s)** (at least one aged 16+) ..... 3 X

OBSERVATIONS FOR REWALK ONLY

R21 **Special measure to control speed:** (multicode if applicable) (SHOWCARD G)

No special measures 1
Road humps/obstacles in road to slow down traffic 2
Speed cameras 3
Artificial curves in road designed to slow traffic 4
Road narrowing to provide pedestrian islands, with parking bays, designed to slow traffic 5
Different type of road surfacing eg brick, paved, bituminous etc 6
Other things to slow traffic – specify_____ 7

(R22) **Bus/Cycle/Tram Lanes** (multicode). Please leave blank if not applicable).

bus lane in one direction 1
bus lanes in two directions 2
cycle lanes in one direction 3
cycle lanes in two directions 4
tram lanes in one direction 5
tram lanes in two directions 6

(R23) **Lanes available for cars** (exclude bus/tram lanes etc)

A small road not wide enough for 1 lane in each direction 1
One lane for each direction 2
2+ lanes for each direction 3
One way road, one lane 4
One way road, 2+ lanes 5

(R24) **Traffic speed**

Faster than most traffic in towns 1
Slower than most traffic in towns or 2
About the same as most traffic in towns? 3
Unable to respond because no traffic at all 4

(R25) **Distance from which you can see cars coming**

	From the Left	From the Right
Less than 20m (approximately less than the distance of 6 cars in a row) (CONTINUE)	1	1
20m-40m (approximately the distance of 6-10 cars in a row) (CONTINUE)	2	2
More than 40m (approximately the distance of more than 10 cars in a row) (GO TO R27)	3	3

(R26) **What is obstructing your view?** (multicode) (SHOWCARD J)

Parked cars 1
Bend in the road 2
Hill 3
Trees 4
A junction with cars turning off another road that are difficult to see 5
Other obstruction (specify) 6

(R27) **Road Type** (If unsure, code your best guess and circle 'E' for estimate)

Main through route 1 E
Local distributor road 2 E
Local residential road 3 E
Local non residential road 4 E
Cul-de-Sac 5 E
Pedestrianised road with some vehicle access 6 E
Access road 7 E

(R28) **Speed limit** (if unsure estimate and circle E) _____ E

FORM 3a	SOCIAL DEMOGRAPHIC INFORMATION (GB)	Serial No:					

ASK RESPONDENT

Q31a Is there anywhere within a ten minute walk of your house which is specially designed for children or young people of your age to play in, such as a playground or adventure playground?

Yes ..... 1 Continue
No ..... 2 Go to Q32a

b) About how long does it take you to walk there from your house? (If more than one, ask about closest)
..... _____mins

c) About how many times would you say you have been there in the last month? (Best estimate)

Q32a Are there other places within a ten minute walk of your house where children/young people of your age can go, like parks, or woods, or other open spaces which are away from the road?

Yes ..... 1 Continue
No ..... 2 Go to Q33

b) How long does it take to walk there? (If more than one, ask about closest)_____ mins

c) About how many times would you say you have been there in the last month? (Best estimate)

Q33 About how many times have you been out or playing in the streets near your home in the last month? _____

ASK PARENT/GUARDIAN IF AVAILABLE. OTHERWISE ASK RESPONDENT/OLDEST PERSON AVAILABLE

Q34a Is the main income earner in your household:
Working 1
Retired 2
Student 3
Unemployed 4

Q34b What is his/her job (or usual/former job if unemployed/retired):

Job title:_____ **..Industry:** _____

Relevant Qualification_____**:Size of company:**_____

If supervisor or manager fill in number of people responsible for:
_____

Social Class: (Do not ask. Circle appropriate code): A B C1 C2 D E

Q35Which of these best describes you/your child's ethnic group? (SHOWCARD F)
White 1
Black - Caribbean 2
Black - African (includes North African) 3
Black - Other 4
Indian 5
Pakistani 6
Bangladeshi 7
Chinese 8
Other - Asian 9
Other/Mixed Race (Please specify)_____ 10

Q36 **Approximately when were most of the houses in the immediate area around where you live built?**
Respondent/parent/interviewer best estimate. If unsure, circle all categories which might apply.
Pre 1920's ..... 1 **1945 to 1965** 3
1920's to 1945 ..... 2 **Post 1965** 4
No idea 5

Q37 **In total, how many children aged 5-15 (inclusive) live at this address?** _____

Q38 **How many cars does your household have available for full time use?** (Enter 0, 1, 2 etc) _____

MOVE TO FORM 3B

FILL IN AFTER THE INTERVIEW

i11 **Sex of respondent**
Male ..... 1 Female 2

i12 **Respondent's Housing Type**
Flat-entrance less than 3m from the road 1
Flat-entrance more than 3m from the road 2
House-front door less than 3m from the road 3
House-front door more than 3m from the road 4
Other - specify _____ 5

i13 **Respondent**
Respondent answered questionnaire entirely 1
Respondent answered mostly, but some assistance from older member of household 2
Respondent and older member of household answered equally 3
Older member of household answered mostly, but some assistance from respondent 4
Older member of household answered entirely 5

i14 **Language of Respondent**
Respondent fluent in English 1
Respondent had some difficulty understanding English 2

i15 **Completed Forms**
Interview ..... Rewalk
Number of 2a forms completed
Number of 2b forms completed

Did the interview cover the entire walk trip/stage of walk trip? **Yes/No** (Circle yes or n
If no, **first/last 20 sections** (Circle first or la
Approximate number of sections not discussed _____

Did the rewalk cover the entire walk trip/stage of walk trip? **Yes/No** (Circle yes or n
If no, **first/last part** (Circle first or la
Approximate number of sections not walked _____

i16 **Interview** Date: Day of week: Time commenced: Time finished:

i17 **Rewalk** Date: Day of week: Time commenced: Time finished:

i18 **Interviewer NameInterviewer Signature**

i19	**Area code:**			
i20	**Random Table Version Number:**			

FORM 3b	PERSONAL DETAILS (GB)		Serial No:					

[THIS FORM SHOULD NOT BE ATTACHED TO THE OTHER FORMS AND SHOULD BE SENT IN THE POST SEPARATE FROM ALL OTHER FORMS/MAPS]

Q39 What is your full name and address?

Full Name: _____

Full Address: _____

_____Postcode _____

Q40 As part of our quality control, a small proportion of interviews we do are backchecked by a supervisor on the telephone. Would you mind giving your phone number? (Include full code)

_____

Q41 It is part of the Market Research Society Code of Conduct that an adult gives their consent to any interview taking place with somebody under the age of 16. Please could you sign this form to confirm that you gave your consent and w ere present during the interview.

I gave my consent to this interview being conducted and was present during the interview.

Name_____ Signature_____ Date

THANK AND CLOSE

Version 2

ACCIDENT SITE FORM	**Serial No:**						

Interviewer
Date of Site Inspection
Time of Site Inspection
Reference Number:
Police Code:
Local Authority Code:

From the information provided to you about the site location, sketch the site below.

- Draw a diagram including all roads within 20m of the accident site, and mark all road names/numbers.
- Each road should be given a unique number. The road the accident occurred on should be labelled '1'. Then number other roads consequentively.
- Each side of **each** road on your diagram should be given a unique number (corresponding to the number you gave the road) followed by the letter 'a' or 'b'. The side of the road the pedestrian crossed from should be labelled '1a' and the side of the road they crossed too should be labelled '1b' (if the child was not crossing the road, the side closest to the position of the accident should be labelled '1a'). Continue to label other sides of roads 2a and 2b, 3a and 3b etc. All roads should have 2 sides (a & b) and no more.
- To help you locate the exact site, mark on the direction the vehicle was going to/from with an arrow labelled 'v' and the direction the pedestrian was going with a 'p' and the accident site with a 'x'.
- Indicate where you took the photo from and the direction you were facing to take the photo with a circle at the point where you stood and an arrow in the direction of the photo eg o→. If there is more than one photo, number on your diagram eg o→1, o→2 etc (angle number). Remember to fill in Photograph Record Sheet.

Q2a Site Location - Difficulties

Please describe any difficulties with identifying the exact site from the information given and describe any uncertainties you have about the exact site location.

Q2b Are any of the following within 100m of the accident site?

	Within 20m	20m - 100m
school	1	5
children's playground	2	6
leisure centre	3	7
other destination likely to be visited by children (specify_____)	4	8

Q3 **Distance from which you can see cars coming** From the Right / From the Left

	From the Right	From the Left
Less than 20m (approximately less than the distance of 6 cars in a row) (continue)	1	1
20m-40m (approximately the distance of 6-10 cars in a row) (continue)	2	2
More than 40m (approximately the distance of more than 10 cars in a row)(Go to Q5)	3	3

Q4 **If Q3 is less than 40m, what is obstructing your view?** (multicode) (SHOWCARD J)

Parked cars	1	1
Bend in the road	2	2
Hill	3	3
Trees	4	4
A junction with cars turning off another road that are difficult to see	5	5
Other obstruction (specify_____)	6	6

Q5 **Is the site identified** (SHOWCARD C)

Right next to a junction (continue)	1
Near a road junction (within 20m ie length of 6 cars) (Continue)	2
Along a stretch of road between road junctions (more than 20m from junction) (Go to Q7)	3

Q6 **What type of junction?** (SHOWCARD D)

T junction minor arm (on the road coming into another road)	1
T junction major arm (the road with another road coming into it)	2
A crossroad (both roads the same size)	3
A crossroad (on the bigger of the two roads)	4
A crossroad (on the smaller of the two roads)	5
A roundabout (could not drive over)	6
A mini roundabout (could drive over)	7
On another type of junction (eg staggered junction, Y junction, slip road, multiple junction) (Specify_____)	8
Across a car park	9

Q7 **Is the site either at, or within, 20M of any of the following?** (SHOWCARD E) (Code either first or second column for all that apply)

	Not at, but at	Not at, but within 20M
A Zebra crossing	1	11
Traffic lights with button for red and green man	2	12
Traffic lights without button for red and green man	3	13
Someone to help you cross eg police, lollipop person	4	14
Island in the road especially for people crossing the road	5	15
Footbridge or subway	6	16
Some other type of marked crossing - (specify)	7	17
Island in the road but not designed especially for people crossing the road	8	18
Not at or within 20m of a marked crossing	9	19

IF ACCIDENT DID NOT OCCUR WITHIN 20M OF A MARKED CROSSING:

Q8 **How long would it take you to walk to a special crossing point on that road?** _____mins _____ secs
(If no marked crossing on the road, write in No Crossing)

FOR Q9-Q19, IF THERE IS NO JUNCTION WITHIN 20M, **FILL IN 'COLUMN 1' FOR THE ROAD THE ACCIDENT OCCURRED ON**. IF THE ROAD CROSSED IS WITHIN 20M OF A JUNCTION, USE A DIFFERENT COLUMN NUMBER FOR EACH ROAD AT THE JUNCTION. EACH COLUMN NUMBER SHOULD CORRESPOND WITH THE NUMBER ON YOUR DIAGRAM IN Q1. PEDESTRIANISED ROADS WITH NO VEHICLE ACCESS CAN BE EXCLUDED.

Q9 **Road type:** (Code one only. If unsure, code your best guess and circle 'E' below)

	Column Number:1	2	3	4	5
Main through road	1	1	1	1	1
Local distributor road	2	2	2	2	2
Residential road	3	3	3	3	3
Cul-de-Sac	4	4	4	4	4
Pedestrianised road with some vehicle access	5	5	5	5	5

	Access roads	6	6	6	6	6
	The above code is only an estimate	E	E	E	E	E
	Column Number:	**1**	**2**	**3**	**4**	**5**
Q10	**Bus/Cycle/Tram Lanes** (multicode. Please leave blank if not applicable)					
	bus lane in one direction	1	1	1	1	1
	bus lanes in two directions	2	2	2	2	2
	cycle lanes in one direction	3	3	3	3	3
	cycle lanes in two directions	4	4	4	4	4
	tram lanes in one direction	5	5	5	5	5
	tram lanes in two directions	6	6	6	6	6
Q11	**Road width:** (exclude bus/tram lanes)					
	Small road not wide enough for 1 lane in each direction	1	1	1	1	1
	One lane for each direction	2	2	2	2	2
	2+ lanes for each direction	3	3	3	3	3
	One way road with one lane	4	4	4	4	4
	One way road with 2+ lanes	5	5	5	5	5
Q12	**Special measure to control speed:** (SHOWCARD G) (Multicode all that apply)					
	No special measures	1	1	1	1	1
	Road humps/obstacles in road to slow down traffic	2	2	2	2	2
	Speed cameras	3	3	3	3	3
	Artificial curves in road designed to slow traffic	4	4	4	4	4
	Road narrowing to provide pedestrian islands, with parking bays, designed to slow traffic	5	5	5	5	5
	Different types of road surfacing in some places eg bituminous, brick, pavement etc	6	6	6	6	6
	Other things to slow traffic – specify_____	7	7	7	7	7
Q13	**Speed Limit** (If unsure, write in best guess and circle 'E')	___E____	E____	E____	E____	E
Q14	**Traffic Volume** (SHOWCARD A)					
	cars pass by only occasionally	1	1	1	1	1
	most of the time you can see 1 or 2 cars driving along on the road, or	2	2	2	2	2
	there are cars passing by all the time?	3	3	3	3	3
Q15	**Traffic Speed**					
	faster than most traffic in towns	1	1	1	1	1
	slower than most traffic in towns, or	2	2	2	2	2
	about the same speed as most traffic in towns?	3	3	3	3	3
	cannot say as no cars passed by	4	4	4	4	4
Q16	**Parked Cars** (SHOWCARD B)					
	parked cars all along, both sides of the road	1	1	1	1	1
	parked cars in some places or on one side of the road	2	2	2	2	2
	no parked cars at all on either side of the road	3	3	3	3	3

LOOK AT THE INFORMATION PROVIDED ON ACCIDENT TIME OF DAY, DAY OF WEEK AND DATE, TO ANSWER Q17-Q19

Q17	**Estimate traffic volume at time accident occurred**					
	more than now	1	1	1	1	1
	the same as now	2	2	2	2	2
	less than now	3	3	3	3	3
	no idea	4	4	4	4	4
Q18	**Estimate traffic speed at time accident occurred**					
	more than now	1	1	1	1	1
	the same as now	2	2	2	2	2
	less than now	3	3	3	3	3
	no idea	4	4	4	4	4

Column Number: 1 2 3 4 5

Q19 Estimate parked cars at time accident occurred

more than now	1	1	1	1	1
the same as now	2	2	2	2	2
less than now	3	3	3	3	3
no idea	4	4	4	4	4

FOR Q20-Q26, USE A DIFFERENT COLUMN LETTER FOR EACH SIDE OF EACH ROAD ABOVE. EACH COLUMN LETTER SHOULD CORRESPOND WITH THE NUMBER AND LETTER ON YOUR DIAGRAM IN Q1. COLUMN 1A AND 1B REFER TO THE TWO SIDES OF ROAD 1 ABOVE, 2A AND 2B REFER TO THE TWO SIDES OF ROAD 2 ABOVE, ETC.

Column Number:	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b

Q20 Path type

Pavement	1	1	1	1	1	1	1	1	1	1
Footpath	2	2	2	2	2	2	2	2	2	2
Other (specify)	3	3	3	3	3	3	3	3	3	3
No path	4	4	4	4	4	4	4	4	4	4

Q21 Pavement width:

Less than 1m	1	1	1	1	1	1	1	1	1	1
1m-3m	2	2	2	2	2	2	2	2	2	2
More than 3m	3	3	3	3	3	3	3	3	3	3

Q22 Barriers (fences/railing) between road and footpath/pavement/where walked (SHOWCARD H) (Multicode)

Railing between road & path/pavement	1	1	1	1	1	1	1	1	1	1
Other raised barrier between road & path (specify)	2	2	2	2	2	2	2	2	2	2
Bank between road and footpath	3	3	3	3	3	3	3	3	3	3
Verge/space between road and path without trees	4	4	4	4	4	4	4	4	4	4
Verge/space between road and path with trees	5	5	5	5	5	5	5	5	5	5
None of these	6	6	6	6	6	6	6	6	6	6
If codes for Q15 are 3 - 5 estimate width, ie distance between road and path in meters										

Q23 Type of buildings: (Multicode where necessary)

Houses with own driveways	1	1	1	1	1	1	1	1	1	1
Houses without own driveways	2	2	2	2	2	2	2	2	2	2
Blocks of flats	3	3	3	3	3	3	3	3	3	3
Shops	4	4	4	4	4	4	4	4	4	4
Other buildings (eg industrial/service - specify)	5	5	5	5	5	5	5	5	5	5
No buildings (eg rural/wasteland/courtyard/carpark/fences/walls)	6	6	6	6	6	6	6	6	6	6

Q24 Distance of buildings from pavement (Multicode where necessary) (SHOWCARD I)

Buildings right next to pavement	1	1	1	1	1	1	1	1	1	1
Buildings separated from pavement by very small garden/courtyard, ie distance from building to pavement is approximately the length of 1 car or less	2	2	2	2	2	2	2	2	2	2
Buildings separated from pavement by big garden/courtyard, ie distance from building to pavement is approximately more than the length of 1 car	3	3	3	3	3	3	3	3	3	3
No buildings	4	4	4	4	4	4	4	4	4	4

Q26 **Approximately when would you estimate most of the buildings in the immediate area were built?** (If variable, code all that might apply. If unsure, code your best guess and circle 'E' below.)

Pre 1920's............ ....1 .... 1 .....1 .... 1 .....1 .... 1 .....1 .... 1 .....1 ....
1920's-1945 ....2 .... 2 .....2 .... 2 .....2 .... 2 .....2 .... 2 .....2 ....
1946-1965........... ....3 .... 3 .....3 .... 3 .....3 .... 3 .....3 .... 3 .....3 ....
Post 1965 ....4 .... 4 .....4 .... 4 .....4 .... 4 .....4 .... 4 .....4 ....
The above code is an estimate only... ....E .... E ....E .... E ....E .... E ....E .... E ....E ....