ROAD INJURIES IN THE NATIONAL TRAVEL SURVEY

UNDER-REPORTING AND INEQUALITIES IN INJURY RISK

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FOREWORD

In this day and age people should not have to be in danger from traffic when they are simply walking our streets. Living Streets warmly welcomes this research which reveals that many injuries experienced by people walking and other vulnerable road users never make it into injury statistics. The government has launched a Cycling and Walking Safety Review and this evidence should help shape proposals to find out the full facts and make our roads and streets safer. The results confirm that motor vehicles pose far and away the biggest danger to pedestrians and cyclists. The report highlights the inequalities in pedestrian injury risk. It is shocking that disabled pedestrians are four times more likely to be injured by a motor vehicle than non-disabled people. People on low incomes, less likely to have alternatives to walking than richer people, are also at higher risk. The report uncovers alarming under-reporting of injuries from pedestrian falls (for example due to faulty pavements) in official figures, disproportionately experienced by women and older people. Making our streets safe and attractive for all pedestrians will involve both protecting people from motor traffic (for example, providing safe crossings, and cutting motor traffic levels and speed in residential areas) and reducing the risk of falls (for example, maintaining pavements and reducing street clutter). We have joined calls for a Vision Zero approach to systematically tackle the root causes of road casualties.

Joe Irvin
CEO Living Streets

This research unearths vital insights into the many thousands of minor injuries occurring on UK streets and roads that go under-reported. It highlights the inequalities in injury risk and shows what a heavy burden motor-vehicles place on everyday life, particularly for disabled people, people cycling and people on low incomes. It shows that road safety is an equity issue and that if we get policy right for the most vulnerable, we get it right for everyone. This contribution should therefore inform future transport policy and practice, and offers timely evidence for the Department for Transport's current Cycle and Pedestrian Safety Review.

Xavier Brice
CEO Sustrans

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SUMMARY

This report shows that injuries sustained on Britain's roads may be around five times more common than police injury statistics suggest. Most involve other road users as well as the injured person, and of these most frequently a car is involved.

Cyclists are the group of road users for which there is the greatest disparity between self-report data and police injury collision statistics. Most of these injuries result from collisions involving motor vehicles, and lead to slight injuries to the cyclist. This high toll of unreported injuries involving motor vehicles can help explain why people think that cycling is particularly risky in Britain.

The dataset allows a comparison of different causes of pedestrian injury (falls, motor vehicle collisions, collisions with a cycle). Cyclist-pedestrian collisions are much less common than are injuries sustained in collision with a motor vehicle, or in a fall.[1]

Neither pedestrian-motor vehicle injuries nor falls are evenly distributed across groups, but the picture is different in each case. For injuries involving a motor vehicle, people in low income households, London residents, younger adults, and especially disabled people experience relatively high risks. For pedestrian falls injuries, key risk factors include gender (women at higher risk than men), disability, and age (older adults at higher risk).

These inequalities are an equity issue. In Britain, cycling infrastructure is usually absent or poor quality, and public transport too often infrequent and/or expensive. Walking may often be the only option for many without car access; among which group low income people, disabled people, and women are over-represented. Hence pedestrians who may have few other options are at higher risk of injury than are other groups, whose walking may be more discretionary. Those who benefit least from car mobility suffer most from its consequences. The high injury rate for cyclists, who pose relatively low risk to others, also indicates potential unfairness.

The data does not tell us why these inequalities exist, nor how to redress them. This is a job for policy discussion and debate, and further research.

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1 These data are likely to under-report pedestrian falls, so the burden for these is likely to be even larger than discussed here.

INTRODUCTION

Icebergs tend to be mostly submerged. Their tip is visible, but a much larger portion lies below the waterline. The same is true for road injuries. A small portion are visible in police or hospital statistics. But many more are not recorded or reported.

Unrecorded and unreported injuries are often 'slight'. Injured people may go to a GP or pharmacist, and sometimes not seek medical attention at all. But most are the product of a violent act: someone is hit with a vehicle, on the public highway. Other injuries, that only involve one person (trips, slips and falls) may still be preventable – for instance, a cyclist rides into a barely visible bollard, or a pedestrian trips over badly placed road furniture. And even slight injuries (or indeed, near misses) can be upsetting, particularly for more vulnerable or marginalised road users, and those with few other options.

This report uses National Travel Survey (NTS) data to explore the extent of road injuries, collisions and falls as reported to the survey by participants from 2007 onwards. Most were never reported to the police, and the majority were treated (if at all) outside a hospital. This means most would not be in our two main sources of official injury data, Stats19 police collision data and Hospital Episode Statistics. The NTS data allows a different perspective, based on people's experiences and memories of what the NTS calls 'road accidents', rather than on official reporting systems.

The report seeks to answer the following questions:

- How many self-reported injuries happen on the public highway, compared to official police injury statistics?

- How does the gap between self-report and police data differ by type of user? When we look at the balance of modes used by people reporting injuries, how does this differ from police recorded injuries?

- How common are pedestrian falls injuries, compared to injuries caused by collisions with motor vehicles or cyclists?

- How does risk of pedestrian injury vary by gender, age, disability, income, and location?

DISPARITIES IN ROAD INJURY RISK

On our roads, injury risk is affected by mode of travel and by demographic group. Categories combine to produce sharp differences between groups; one example being the high injury risk faced by child pedestrians in deprived areas.

Britain's modal disparities in injury risk widened during the post-war period, as motorisation grew. While the lack of pre-1970s data makes it difficult to compare longer-term changes in pedestrian injury risk, we can compare cyclists and car users. Despite a substantial, long-term decline in injury risk for car users between the 1950s and present day, the risk per vehicle km ridden during this period initially grew for cyclists, and is now still only somewhat improved from the early 1950s. Recent figures on changes in cyclist injury risk are not encouraging, as shown in Table 1 below (adapted from Aldred et al 2017).

Table 1: Changes in injury risk in Britain, 1991-2011					
Injuries per commuter	1991	2001	2011	Relative change 1991-2001	Relative change 2001-2011
Cyclist KSIs* per 1000 cycle commuters	18.0	11.6	12.0	-35.7%	+3.6%
Pedestrian KSIs per 1000 pedestrian commuters	16.4	10.4	6.2	-36.7%	-40.6%
Motor vehicle user KSIs per 1000 motor vehicle commuters	6.3	4.6	2.3	-27.3%	-49.0%

*Casualties who are killed or seriously injured

Given policy-makers want to increase use of the 'vulnerable' yet healthy modes of walking and cycling, disparities in risk are problematic. This includes both disparities between modes (e.g. car users versus pedestrians), and within modes (e.g. low income versus high income pedestrians). There are important social equity issues where, for instance, children in deprived areas benefit least from the mobility offered by private cars yet suffer most from the health risks created by their use.

ROAD INJURY RESEARCH IN BRITAIN

In Britain, most road injury research uses police injury collision data ('Stats19'). This publicly available data has information on age and gender, while police records contain further information, e.g. on victim postcodes. Stats19 includes information about vehicles involved in collisions, allowing for instance cyclist-pedestrian collisions to be separated from those involving motor vehicles.

Stats19 data is a great resource, but like any dataset it has disadvantages. There is systematic under-reporting, particularly for slight injuries, although data on deaths is generally accurate. Under-reporting may be skewed: for instance, anecdotally cyclists have said police fail to record injuries caused by tram-track falls. Because police may concentrate on those incidents that legally must be reported, incidents not involving motor vehicles may in general be under-reported. And Stats19 never covers pedestrian falls.

Due to its origins in roads policing, Stats19 only covers incidents on the public highway (including footways and cycle tracks adjacent to roads). An alternative dataset sometimes used is Hospital Episode Statistics (HES), which includes more serious incidents for which people were admitted to hospital, coded as ICD-10 ('transport accidents'). HES may be more reliable than Stats19 for serious injuries, but will not include most injuries, which do not involve a 'hospital episode'.

Until recently, HES and Stats19 were the only source of administrative road injury data for Britain, except for coroner's reports on deaths. However, since 2007 the National Travel Survey (NTS, covering Britain until 2012, from 2013 only England) has asked about 'road accidents'.[2] Like Stats19, NTS data only covers incidents on a public highway. It includes both single-bicycle incidents and – unlike Stats19 – pedestrian falls. The NTS data allows a different angle on road injuries and collisions, based on the perspective of those involved rather than police or hospital staff. Like those datasets, it is not a complete picture and based on the results in this report, it looks like pedestrian falls are under-reported. This might be because people don't see falls as a 'road accident' even if prompted, or because the NTS doesn't include people who have moved into a residential home, for instance.

NTS data includes information on disability, a category under-researched in injury analysis partly due to lack of data. But disability may be a factor in road injury risk. One of very few studies to explore this, by Xiang et al in the USA, found that after controlling for other variables, disabled children were **more than five times more likely to have been hit by a motor vehicle** as a pedestrian or cyclist than their non-disabled peers.

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2 In this report I refer to 'accidents' rather than accidents, to reflect the belief that many road injuries are preventable and hence 'accident' is not an appropriate descriptor for road injuries in professional language.

About the NTS data

The full injury data is held by the UK Data Archive within the Secure Data Service (SDS). The data covers Britain between 2007–12, but England only from 2013. For adults (who were directly asked all injury questions) all data has been used here so as not to lose any incidents; where population comparisons are made the appropriate populations have been selected.

Respondents were asked about involvement in incidents ('road accidents') over the past 3 years and 1 year, and about the numbers of injuries. The 'gateway' question is:

"In the last 3 years, that is since [Date], have you been in any type of road accident, no matter how minor?

Please include any accidents in which you were involved as a pedestrian, driver, passenger, cyclist or motorcyclist, even if no other party were involved.

Only include incidents that happened on a public road, including pavements and cycle lanes on the public road."

Those who have experienced a road 'accident' over the last three years are invited to provide more details about the last incident in which they were involved, including any injury, police involvement, treatment required, mode used and involvement of other vehicles (cycles and motors) and pedestrians. Data on mode is limited; pedestrians, cyclists, motorcycles and cars are separately listed, but any other vehicle types are included on the same 'Other' code.

The weighted NTS dataset used contained 147,185 individuals. Other datasets used were Stats19 data and data from Nomis on population numbers, prepared to be comparable with the NTS data used. Analysis was conducted in SPSS Statistics and Microsoft Excel. More detail on methods and analysis can be found, in the academic paper written on this study (in press at the time of writing, in the Journal of Transport and Health).
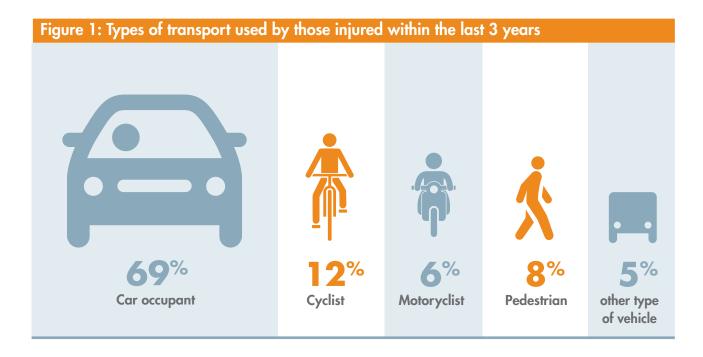
FINDINGS

Levels of self-reported injury

Of those involved in an 'accident', 5,610 (/17,980) said they were injured during their last incident. People were asked if they had been involved in any incidents during the past year; from this we can derive the number injured within the last year: 2,474 people, or 1.7% of the entire sample. Comparing this to figures for the relevant population and injuries reported in Stats19 suggests that there may be around five times more injuries occurring on the public highway than are recorded by police. In around a quarter of cases respondents said that the police attended the incident.

Casualty modes and under-representation

14,277 provided answers to questions about the mode used during their most recent 'accident' and other further detailed questions. For incidents in the past three years, 84% said they were in a car; 5% cyclists, 5% other vehicle users, 4% pedestrians and 2% motorcyclists.

But if we look only at 4,311 people **injured** in the last incident they were involved in (over the past three years), who said which type of transport they were using, the picture is somewhat different.

Figure 1: Types of transport used by those injured within the last 3 years

| **69%** Car occupant | **12%** Cyclist | **6%** Motoryclist | **8%** Pedestrian | **5%** other type of vehicle |

In this data, cyclists are the single largest group of 'vulnerable' injured road users in both three-year and one-year data.

In terms of last-year injuries, 65% of people injured were in a car, 16% on a cycle, 6% on a motorcycle and 9% on foot. In the most recent NTS statistics (2016), 62% of trips in England were

Table 2: Injuries and involvement by mode			
Mode	In incident (last 3 years)	Injured in incident (last 3 years)	Injured in incident (last year)
🚗	11975	2987	1190
🚲	717	521	292
🏍	342	243	112
🚶	512	326	160
Other	731	234	83
Total who stated a mode	14289	4311	1837

made by car, 25% on foot, 2% by cycle and under 1% by motorcycle; while looking by distance, 78% of distance is travelled by car, 3% on foot, 1% by cycle and under 1% by motorcycle.
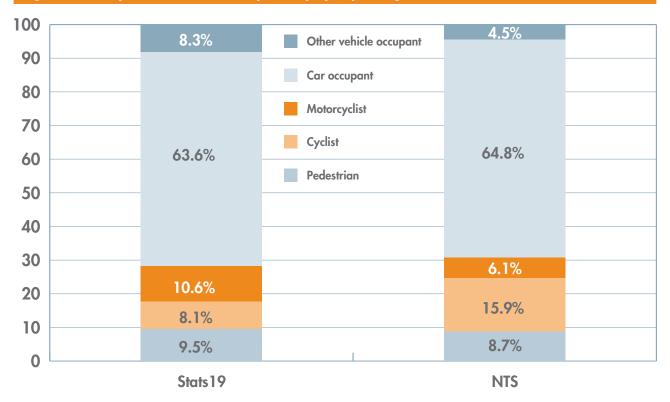
Figure 2 on page 10 compares the types of transport used by injured people in the NTS data to that recorded in Stats19 police collision data.

The figure shows that the proportions of car occupants and pedestrians injured are similar in both datasets, but differences exist for the other mode groups. 'Other vehicle occupants' are 8% of the injured in Stats19, but only 5% in NTS, while motorcyclist mode share falls from 11% to 6%. By contrast the proportion of the injured who were cycling doubles: from 8% to 16% of injured people.

Table 3 compares the injury risks that we get from the past-year NTS injury data, with the per-mile reported by DfT using Stats19 data. The NTS includes a week travel diary with data on time spent using different modes as well as distances travelled, so the NTS figures have been calculated on a per-hour as well as a per-mile basis.

Using the NTS data, per mile travelled, cycling has the highest injury risk, while per hour travelled, motorcycling has the highest injury risk. Per hour, walking has the lowest injury risk, while per mile, cars and other motor vehicles have the lowest injury risks. The comparison with reported Stats19 figures show that the NTS reports around three times more injuries per mile for both walking and motorcycling. For car use and especially for cycling, the differential is higher (nearly seven times higher risk of injury for cycling). Almost all injuries self-reported in NTS are relatively minor. However, severity differs between groups. Cyclists were more likely to report an injury for which medical attention was not sought (for instance, involving cuts and bruises).

Figure 2: Comparison of NTS one-year injury reporting and Stats19 data *(Stats19 excluding deaths)*

Legend:
- Other vehicle occupant
- Car occupant
- Motorcyclist
- Cyclist
- Pedestrian

Stats19:
- Other vehicle occupant: 8.3%
- Car occupant: 63.6%
- Motorcyclist: 10.6%
- Cyclist: 8.1%
- Pedestrian: 9.5%

NTS:
- Other vehicle occupant: 4.5%
- Car occupant: 64.8%
- Motorcyclist: 6.1%
- Cyclist: 15.9%
- Pedestrian: 8.7%

Table 3: Per-hour and per-mile risks by mode, NTS data, and comparison with Stats19

Mode	Injuries last year*	Injuries/ million hours use	Injuries/ million miles	Stats19 injuries/ million miles, 2006–15**	Ratio NTS: Stats19
(cyclist)	292	346	41	6.0	6.8
(motorcyclist)	112	491	20	6.5	3.1
(pedestrian)	160	17	6.4	2.3	2.8
(car)	1190	36	1.4	0.3	4.3
Other	83	76	1.3	-***	-***

*all past-year injuries; rates then calculated using the travel diary sample, i.e. injuries reported by those filling in the travel diary divided by total travel reported by those filling in the travel diary
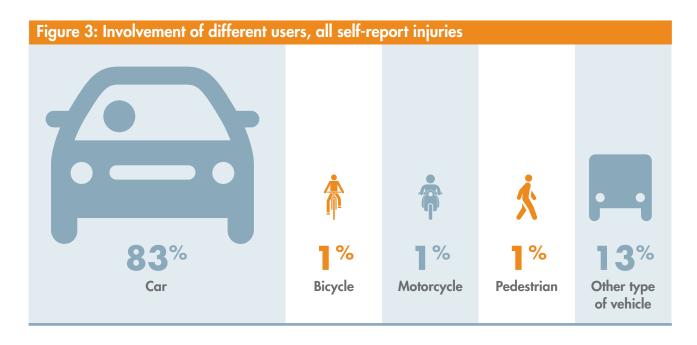**calculated from table RAS53001, reported in injuries per billion passenger km
***not calculated

Who else is involved in incidents

Considering injury incidents within the past three years, 17.9% (769) were incidents in which no other vehicle or pedestrian was involved. Injured car users were relatively unlikely to report this kind of injury, while by contrast, cyclists, motorcyclists, and pedestrians all reported just over a third of injuries were single-bike incidents or falls. 'Other type of vehicle' injuries not involving anyone else are likely to be diverse but could mean someone falling over in a bus, for instance.
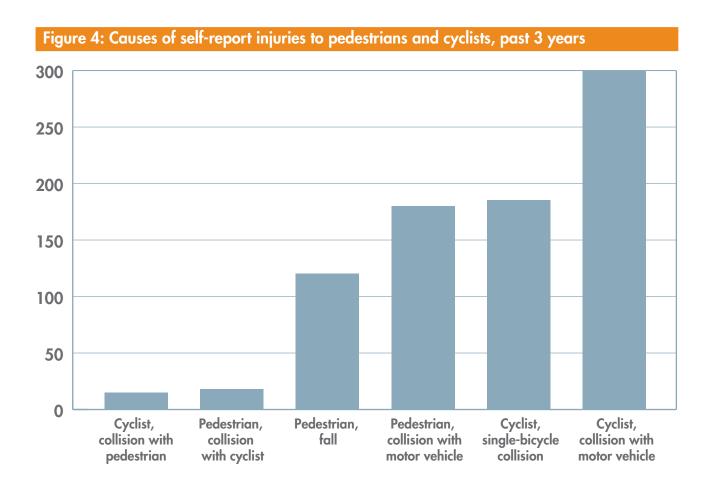
The 37% of pedestrian injuries not involving anyone else are pedestrian falls injuries. This is likely to be an underestimate. Other research using different types of data – for example studies of hospital admissions, or cohorts of older people who are more vulnerable to falls – have found substantially more pedestrian falls injuries. Why are the rates lower here? One reason might be that people are less likely to remember falls injuries, or to class them as a 'road accident' (even though NTS asks them to include incidents not involving anyone else). Another is that NTS only includes people living in private households, and therefore won't cover people who live in residential home type accommodation, including people who've had a fall in the past three years which led to their moving into such accommodation.

For incidents where others were involved, participants reported a total of 3,598 types of other road user involved in their incident (i.e. sometimes >1 per injury). Only 2% (104) were bikes or pedestrians, while 83% were cars, 13% other vehicles, and 1% motorbikes.

Figure 3: Involvement of different users, all self-report injuries

| **83%**
Car | **1%**
Bicycle | **1%**
Motorcycle | **1%**
Pedestrian | **13%**
Other type of vehicle |

Looking just at pedestrian and cycle incidents, for each group collisions involving motor vehicles are most numerous and lead to most injuries. Within the past three years, participants reported 59 incidents only involving pedestrians and cyclists, leading to 32 injuries to a pedestrian or to a cyclist. This compares to 723 incidents affecting people as pedestrians or cyclists which involved motor vehicles, leading to 479 injuries to participants.

Numbers of cyclist-pedestrian collisions are too low for significance testing of subgroups. So there is no evidence here that any subgroup is at greater risk than others of being injured by cyclists as pedestrians – whereas as discussed below, there are differences by subgroup for pedestrian injuries caused both by motor vehicles and by falls.

Figure 4: Causes of self-report injuries to pedestrians and cyclists, past 3 years

Pedestrian falls and motor-vehicle related injuries: risks per person and per mile, by group
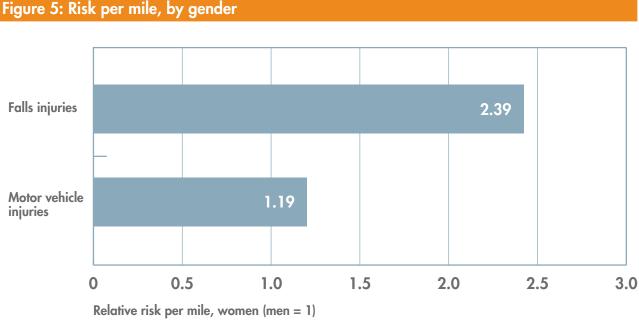
This section looks at which groups of pedestrians are injured in falls, and which in motor-vehicle related injuries. Injured pedestrians are defined as those injured as a pedestrian in their last incident during the past three years, to use as much data as possible. This means 182 pedestrians injured in collisions with motor vehicles and 121 pedestrian injury falls (incidents where a pedestrian is injured, with no other vehicles or pedestrians involved).

The graphs below look at whether different demographic groups are over-represented for pedestrian falls and motor-vehicle related injuries. The main measure used here is the number of injuries per mile walked, rather than just per head of population, because walking levels differ by demographic group. NTS data has been grossed up to calculate the amount of walking done by each demographic group (for instance, by women versus men). The risk measure is then calculated as a ratio – so for instance, comparing women to men, in terms of per-mile risk.

The measure allows us to compare the risks people face when walking a given distance. However, it does not allow us to separate out the effects of different factors. For instance, older people and disabled people may both have higher risks than younger and non-disabled adults. However, older people are more likely than younger people to be disabled, and if we only look at the two factors separately, we don't know whether it's age or disability that is more important in affecting levels of risk.
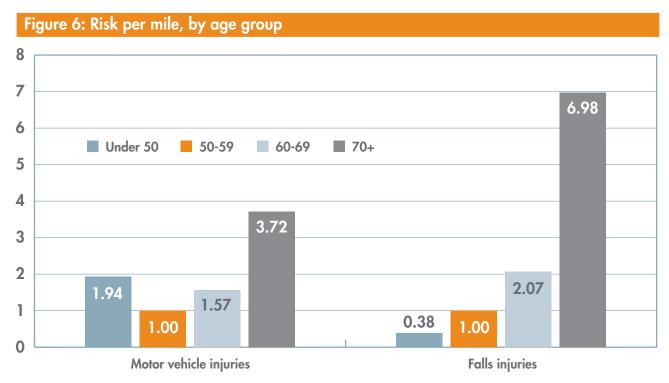
Gender

Among pedestrians injured by motor vehicles, women are somewhat over-represented on a per-person basis. However, those injured in falls are overwhelmingly female (88/121 fall victims). When we look at injuries per mile walked, a similar picture remains (unsurprisingly, as women and men walk relatively similar distances).

Figure 5: Risk per mile, by gender

Relative risk per mile, women (men = 1)

Age

In the whole dataset and among those injured by motor vehicles, under-50s make up over half of participants. Over-70s and under-50s are somewhat over-represented among pedestrians injured by motor vehicles; while groups in between seem under-represented. However, for falls around half of all people injured are aged 70+, compared to under 20% in both the other

Figure 6: Risk per mile, by age group

Relative risk per mile, by age group (50-59 = 1)

groups. The per-person risk of a falls injury increases dramatically with age, whereas for a motor vehicle injury the relationship is less clear. When looking at per-mile rates, the risk at older ages becomes higher, because walking levels are lower than for younger people.

Disability

Among those in both injury groups, there are substantially higher proportions of disabled people – for falls injuries this is well over 40%, compared to under 20% in the broader sample. For both types of injury, disabled pedestrians have a substantially elevated risk, whether calculated per person or per mile. The gap is greater per mile, because disabled people report walking shorter distances compared to non-disabled people.[3]

Car ownership

Across all participants, under 20% live in a non-car owning household. However, over 50% of injured pedestrians live in non-car owning households. There are very large disparities in risk per person for both motor vehicle injuries and falls. These become somewhat smaller when considering injuries per mile, because people without cars walk further than car owners; however, the gap remains substantial.

3 In figure 7, injuries involving an in-patient stay are excluded. This is because of the potential for confounding when considering disability: a serious injury itself may lead to someone becoming disabled. Hence, someone not disabled three years ago, could have sustained a disability in the injury on which they are reporting.

Figure 7: Risk per mile, by disability status

Falls injuries — 6.34

Motor vehicle injuries — 4.60

Relative risk per mile, disabled people (non-disabled people = 1)

(x-axis: 0 1 2 3 4 5 6 7 8)

Figure 8: Risks per mile, by car ownership

Legend: No cars | One car | Two or more cars

Motor vehicle injuries
- No cars: 3.01
- One car: 1.25
- Two or more cars: 1.00

Falls injuries
- No cars: 4.59
- One car: 1.77
- Two or more cars: 1.00

Relative risk per mile (2+ car owners = 1)

Figure 9: Risks per mile, by household income

Relative risk per mile (>£50,000 = 1)

Legend:
- Less than £25,000
- £25,000 to £49,999
- £50,000 and over

Motor vehicle injuries: 2.96, 1.28, 1.00
Falls injuries: 3.54, 1.46, 1.00

Income

While nearly 30% of all participants were in the top household income category (£50,000+), 15% or less of all participants in the two injury groups were in the same category. A typical pedestrian who has experienced an injury lives in a household with income of less than £25,000, but this group only constitutes 40% of the adult population. There is also a substantial per-mile gap in risk between people living in households with income of under £25,000, and middle and higher income earners.
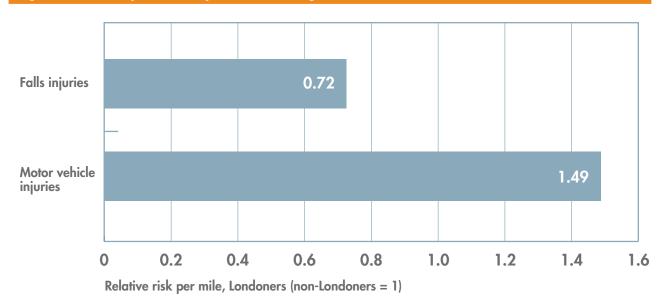
London

Per-person, Londoners have almost double the per-person motor vehicle injury risks of non-Londoners, although the gap declines per-mile, because Londoners walk further on average than non-Londoners. For falls, injuries per mile and per person are somewhat higher for non-Londoners.

Modelling the contribution that different factors make to injury risk

The figures above compare risks on a per-mile basis, for a range of different factors. However, this doesn't tell us about the relative contribution of different factors, which is important given that some of the factors are associated with each other (Londoners may appear to be at lower risk of falls because of the capital's relatively young population, for instance). So the final piece of analysis in this report used SPSS to build two binary logistic regression models, with the

Figure 10: Risks per mile, by whether living in London

Relative risk per mile, Londoners (non-Londoners = 1)

outcomes being (i) being injured as a pedestrian by a motor vehicle in the past three years and (ii) experiencing a pedestrian fall injury in the past three years. These models can separate out the impact of different factors on injury risk.

Potential inaccuracy is introduced, because possibly being injured makes people less likely to walk; and the data on walking levels comes from a question about current levels of walking. Sensitivity testing was carried out to examine the impacts of this and other potential biases, which generally made relatively little difference to the results (the exception being the higher risk of falls associated with disability, which in some cases then failed to reach statistical significance).

The models included variables based on most of the factors discussed above, but not car ownership, which is strongly associated with household income (included in the model). It also used a more general 'walking frequency' question, rather than past-week distance walked. Distance walked comes from the NTS trip diary and has a large amount of missing/zero data, and issues deriving from data on short walks, making it more problematic at an individual level than when grossed up for groups as in the previous section.

A note on odds ratios
Binary logistic regression modelling produces 'odds ratios', not relative risks. However, where events are rare (as here), odds ratios are similar to relative risks.

Factors associated with pedestrian-motor vehicle injuries
Firstly, the paper reports the results of a binary logistic regression model for motor vehicle injuries.

The following are statistically significant (p<0.05) in the maximally adjusted model (and are **highlighted in orange**):

- Living in a household earning below £25,000 was associated with more than double the odds of injury

- Living in London was associated with an almost doubling of injury odds

- Injury odds tended to reduce with age (for adults 16+; note the contrasting finding for disability, which increases with age)

- Injury odds for disabled people were over four times higher than for non-disabled people.

Table 4: Factors associated with higher odds of pedestrian-motor vehicle collision injury				
Individual characteristics	**p-value**	**Odds ratio**	**95% confidence intervals**	
			Lower	**Upper**
Household income under £25,000	<0.01	2.36	1.71	3.26
Male	0.42	0.88	0.66	1.19
Disabled	<0.01	4.79	3.37	6.80
Age	<0.01	0.98	0.97	0.99
London resident	<0.01	1.91	1.34	2.71
Walking frequency (compared to rarely or never)	0.13			
Walks 3+ times a week	0.14	1.33	0.91	1.97
Walks 1-2 times a week	0.93	0.98	0.61	1.57
Walks once a year or more, but less than once a week	0.41	0.79	0.45	1.38

Factors associated with pedestrian falls injuries

Again, factors significant in the adjusted model are **highlighted in orange**. The model shows being female, disability, age, and higher reported walking frequency are associated with elevated risk. Specifically:

- Being female is associated with a doubling of injury odds

- Being disabled is associated with a doubling of injury odds

- Age is associated with an increase in injury odds

- Greater reported walking frequency is associated with an increase in injury odds.

Table 5: Factors associated with higher risk of pedestrian falls injuries				
Individual characteristics	p-value	Odds ratio	95% confidence intervals	
			Lower	Upper
Household income under £25,000	0.09	1.43	0.95	2.17
Male	<0.01	0.43	0.28	0.65
Disabled	0.01	2.00	1.31	3.08
Age	<0.01	1.05	1.04	1.07
London resident	0.71	1.11	0.64	1.92
Walking frequency (compared to rarely or never)	0.01			
Walks 3+ times a week	<0.01	2.73	1.62	4.59
Walks 1-2 times a week	0.02	2.47	1.40	4.35
Walks once a year or more, but less than once a week	0.44	1.33	0.64	2.77

POLICY IMPLICATIONS

While much new material is discussed here, the analysis has inherent limitations. Risk factors here largely relate to slight injury, not to the more commonly analysed deaths and serious injuries. However, such injuries may have an effect far beyond any direct impact on health. Like near misses they may make people fear for their safety. Further, inequities in pedestrian injury risk are a social justice issue, especially as many groups at greater risk have fewer alternative options. For instance, many people on low incomes will have no car access and may struggle to afford public transport, even if they have access to it.

The under-reporting of cycling injuries may help explain the perception among many people that cycling is much riskier than walking. The NTS data suggest that slight injuries to people cycling are, per hour or per mile, much more common than slight injuries to people walking. Indeed, the NTS data shows substantially more people experiencing cycling than walking injuries, most caused by an incident involving a motor vehicle. This sitting alongside the – well known – much higher rates of walking than cycling in Britain may contribute to this perceived risk gap.

While around a third of self-report pedestrian and cyclist injuries on public roads involve no one else, these injuries do not necessarily stem from the modes themselves. For instance, older cyclists may be less able to manoeuvre around obstacles such as bollards, so creating routes free of such infrastructure can help reduce their (relatively high) injury risk. Similar approaches can be followed to reducing pedestrian injury risk. Given an ageing population, there is a need to study and reduce the risk of falls on the public highway among older and disabled pedestrians, while maintaining active mobility. However this is currently under-researched.

Equity issues raised here deserve consideration. People living in lower-income households have elevated risk of being injured by a motor vehicle as pedestrians, as do Londoners and especially disabled people. For falls, women and older pedestrians are at particularly high risk. This sheds new light on the fears of injury that such groups may express. This predominantly relates to slight injuries, which may have an effect that goes well beyond any medical impact (as indeed may the experience of street crime – also often disproportionately feared by such groups – even if physical violence is not used and/or no injury sustained).

While not dictating street design, the data provides insight into why groups express certain views. For instance, disabled people's groups frequently oppose 'shared space' designs. This is often treated as a 'comfort' issue, with planners highlighting the relatively good injury record of shared space environments. However, as disabled pedestrians are at particularly high risk of being injured by motor vehicles, the fear of losing space designated for pedestrians becomes not solely about perception. It is based on felt experience of elevated injury risk not shared by non-disabled people. By contrast, the data suggests the fear of cyclists often expressed by

pedestrians in Britain may be more an issue of perception or comfort. The risk of being injured by a cyclist is low and there is no evidence that cyclists pose greater risks to vulnerable pedestrians.

Similar points could be made in relation to cycling injury risk. The concern about elevated cycling injury risk is real, and the desire expressed by many for cycle infrastructure protected from motor vehicles appears – as with disabled pedestrians' similar expressed wish for protected space – rooted in safety concerns as well as comfort. We know that risk is less tolerable when perceived as inequitable, or where the person experiencing the risk feels they lack control over it. This may further aggravate the perception of risk given that cyclists pose little risks to others and that the predominant cause of injury to them is a collision with a motor vehicle.

FURTHER READING

Ahmed, A., Sadullah, A.F.M. and Yahya, A.S. (2017) Errors in accident data, its types, causes and methods of rectification-analysis of the literature, Accident Analysis and Prevention, in press, corrected proof, http://www.sciencedirect.com/science/article/pii/S0001457517302531

Aldred, R. (2016) Cycling near misses: Their frequency, impact, and prevention, Transportation Research Part A: Policy and Practice 90, 69-83.

Aldred, R., Elliott, B., Woodcock, J. and Goodman, A. (2017) Cycling provision separated from motor traffic: a systematic review exploring whether stated preferences vary by gender and age, Transport Reviews 37 (1), pp. 29-55.

Aldred, R., Goodman, A., Goel, R. and Woodcock, J. (2017) Contextualising Safety in Numbers: a longitudinal investigation into change in cycling safety in Britain, 1991–2001 and 2001–2011, Injury Prevention, in press: http://injuryprevention.bmj.com/content/early/2017/11/30/injuryprev-2017-042498.

Boufous, S., Ivers, R., Senserrick, R., Stevenson, M., Norton, R. and Williamson, A. (2010) Accuracy of self-report of on-road crashes and traffic offences in a cohort of young drivers: the DRIVE study, Injury Prevention 16(4), 275-277.

Department for Transport (2016) Reported road casualties Great Britain, annual report: 2015, available at https://www.gov.uk/government/statistics/reported-road-casualties-great-britain-annual-report-2015 .

Department for Transport (2017) Policy Paper: Cycling and Walking Investment Strategy, available at https://www.gov.uk/government/publications/cycling-and-walking-investment-strategy.

Eilert-Petersson. E. and Schelpa, L. (1998) An epidemiological study of non-fatal pedestrian injuries, Safety Science, 29(2), 125-141.

Freund, P. and Martin, G.T. (1997) Speaking about accidents: the ideology of auto safety, Health: An Interdisciplinary Journal for the Social Study of Health, Illness and Medicine, pp. 167–182.

House of Commons Library (2013) Road cycling: statistics, Standard Note: SN/SG/06224, available at http://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN06224.

Laflamme, L. and Diderichsen, F. (2000) Social differences in traffic injury risks in childhood and youth—a literature review and a research agenda, Injury Prevention 6: 293-298.

Methorst, R., Schepers, P., Christie, N., Dijst, M., Risser, R., Sauter, D. and van Wee, B. (2017) 'Pedestrian falls' as necessary addition to the current definition of traffic crashes for improved public health policies, Journal of Transport and Health 6, pp.10-12.

Mindell, J., Leslie, D. and Wardlaw, M. (2012) Exposure-Based, 'Like-for-Like' Assessment of Road Safety by Travel Mode Using Routine Health Data, PLOS One, http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0050606.

Mitchell, G. and Dorling, D. (2003) An environmental justice analysis of British air quality, Environment and planning A, 35, 909-929.

Rolison, J. J., Hewson, P. J., Hellier, E., & Husband, P. (2012). Risk of fatal injury among older adult drivers, passengers, and pedestrians. Journal of the American Geriatric Society, 60, 1504-1508.

Schepers, P., Agerholm, N., Amoros, E., Benington, R., Bjørnskau, T., Dhondt, D., de Geus, B., Hagemeister, C., Loo, B.P.Y. and Niska, A. (2015) An international review of the frequency of single-bicycle crashes (SBCs) and their relation to bicycle modal share, Injury Prevention 21: e138–e143.

Schepers, P., Brinker, B., Methorst, R. and Helbich, M. (2017) Pedestrian falls: A review of the literature and future research directions, Journal of Safety Research 62: 227-234.

Slovic, P. (2000) The Perception of Risk. London: Earthscan.

Sonkin, B., Edwards, P., Roberts, I. and Green, J. (2006) Walking, cycling and transport safety: an analysis of child road deaths, Journal of the Royal Society of Medicine, 99, 402-504.

Steinbach, R., Green, J., Edwards, P. and Grundy, P. (2010) 'Race' or place? Explaining ethnic variations in childhood pedestrian injury rates in London, Health & Place 16(1), 34-42.

Steinbach, R., Green, J., Kenward, M.G. and Edwards, P. (2016) Is ethnic density associated with risk of child pedestrian injury? A comparison of inter-census changes in ethnic populations and injury rates, Ethnicity & Health 21(1), 1-19.

Tinetti, M.E. and Williams, C.S. (1995) Falls, injuries due to falls, and the risk of admission to a nursing home. New England Journal of Medicine 337 (18), pp. 1279-1284.

Tournier, I., Dommes, A. and Cavallo, V. (2016) Review of safety and mobility issues among older pedestrians, Accident Analysis and Prevention 91, pp. 24–35.

Ward, H., Lyons, R. and Thoreau, R. (2006) Under-reporting of Road Casualties – Phase 1, Road Safety Research Report No. 69, London: Department for Transport.

Xiang, H., Zhu, M., Sinclair, S.A., Stallones, L., Wilkins, J.R. and Smith, G.A. (2006) Risk of vehicle–pedestrian and vehicle–bicyclist collisions among children with disabilities, Accident Analysis & Prevention 38(6), 1064–1070.