MSc Project Report
2013-2014

Female cycling in England and Wales: gender differences in cycling uptake and rates of cyclists 'killed or seriously injured' (KSI) in London and nine UK comparison cities

Supervisors: Dr Phil Edwards, Dr Andrei Morgan

Candidate number: 108102

Word count: 9923

Submitted in part fulfilment of the requirements for the degree of

MSc in Public Health (General)

September 2014

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ACKNOWLEDGEMENTS

Formal acknowledgement of academic support

I am extremely grateful for the support I have received from both of my supervisors at the London School of Hygiene and Tropical Medicine.

Project development

Dr Edwards and Dr Morgan had the initial idea to analyse cycling injuries by gender. I developed this idea and decided to analyse female rates of cycling and injury in UK cities. My supervisors continued to help me formulate this project through regular discussion. I then devised the study design and decided on data sources used for analysis. I also decided to undertake an extensive literature review on this subject in order to explore the wider subject of female cycling.

Contact, input and support

Both my supervisors met me together, fortnightly, during the first six weeks of the project period to offer overarching guidance on the direction of my project and analysis of data. I also had another meeting with Dr Morgan, during the later phase of the project period, to discuss preliminary results and analysis. Both supervisors commented on the first draft of my project, offering minor suggestions for improvement, and continued to support me by email during the final weeks of the project period.

Main research work

I conducted the literature review and the collection, extraction and analysis of data for this project myself. I was given advice on STATS19 data by my supervisors and was able to discuss analysis techniques with them.

Acknowledgement of other support

I am grateful to Dr Rebecca Steinbach who also kindly assisted me in understanding how to merge STATS19 datasets at the beginning of my project.

I also acknowledge the help I received from the National Travel Survey and, in particular, Glenn Goodman, who has generously taken time to help with the provision of data for this project. Similarly, personal correspondence with Carole Austin, from the ‘Census Helpdesk’ has been helpful in informing my knowledge in this area.

ABBREVIATIONS AND NOTES

CI	Confidence Interval
CTC	National Cycling Charity
DLA	District Local Authority
F	Females
HGV	Heavy-goods vehicle
Km	Kilometre
KSI	Killed or seriously injured
M	Males
NHS	National Health Service
No.	Number
NRTS	National Road Traffic Survey
NTS	National Travel Survey
ONS	Office for National Statistics
Pr	Probability
SD	Standard deviation
SE	Standard error
TfL	Transport for London
TRID	Transport Research International Documentation
UK	United Kingdom
Yr	Year

Results in this project are given to the nearest whole number for population and numbers of cyclists, one decimal place for percentages, rates and ratios, two decimal places for confidence intervals (CI) and three decimal places for probabilities, unless otherwise stated.

ABSTRACT

Background

Recognition of the health, environmental and economic benefits of 'active travel', has led to calls to increase cycling uptake. Whilst these benefits are known to extend to women, there have historically been few female commuter cyclists in the United Kingdom (UK). There is also concern that females are at more risk of being killed or seriously injured (KSI) than males, potentially further discouraging women from cycling. This project investigated female cycling uptake and cyclist KSI rates in ten UK cities.

Methods

This research used STATS19, Census, Office for National Statistics and National Travel Survey data to analyse cycling uptake and KSI rates, from 2005-2013. Working age cyclists in London, Birmingham, Bradford, Bristol, Cardiff, Leeds, Leicester, Liverpool, Manchester and Sheffield were included. Rates were calculated using exposure measures of population, number of people who cycle to work and total miles cycled.

Results

Barriers to female cycling include environmental and safety concerns and conflicts with female identity and responsibilities. Cycling uptake remains low in England and Wales, with 1.6% of women cycling to work, though this varies geographically. On average, 21.8% of London KSI cyclists are female; nationally, numbers of women KSI vary but are highest in London and Bristol. Female rates also vary geographically; comparing female with male cyclists, KSI relative risk decreased by 7% (CI 0.87-1.01; p=0.078), but this altered depending on exposure measure used.

Conclusions

Cycling remains 'gendered' in the UK, with fewer women cycling compared with men and with other countries. Public health bodies need to reduce geographical variation in cycling uptake and KSI rates. The female to male KSI rate ratio also varies depending on exposure measured used. Population-based exposure measures are particularly flawed for assessing cycling risk by gender and there is need for international agreement on the most accurate measure to use.

(Word count: 298)

1. INTRODUCTION

Cycling is a form of 'active travel', which has been suggested as a method of preventing and treating long term health conditions, such as the huge burden of disease from obesity (1). It is seen as a key way to facilitate this because it is thought to improve health in multiple ways (2)(3)(4), and because the health benefits from cycling outweigh the risks from it (5)(6). Evidence suggests that the benefits from commuter cycling may also be particularly relevant to women as they are otherwise less likely than men to incorporate regular exercise into their daily routine (7). Increased 'active travel' may also produce financial benefits, with an estimated saving to the National Health Service (NHS) of £17 billion (8). Alongside these health and economic benefits, increasing cycling uptake is also recognised as a potential way of reducing the environmental damage from other forms of transport (9)(10) and, together, these arguments have led to a public health drive to encourage cycling (11)(12)(13).

Yet, despite this increased policy drive and political will, uptake of cycling across the United Kingdom (UK) has historically been varied. Evidence suggests that there has been a general increase in pedal cycle traffic in the UK (14), particularly in cities such as London, where the number of cyclists using the Transport for London Road Network has grown by '173% between 2000/01 and 2011/12' (15). However numbers cycling are much lower in other parts of the UK and 'rare' in some cities (16), and women have previously cycled less than their male counterparts throughout the UK (16). There is also persistent concern regarding the number of killed or seriously injured cyclists (KSI). In London, KSI cyclists 'were up 16%' in 2013 (15) and have also increased nationally, with numbers 11% higher in 2008 than 2004 (17) and cyclists representing the sole road user type in whom numbers have not decreased (14). However, previous research has also suggested that this increase may not be uniform, with wide geographical variation in KSI numbers (17). Of perhaps even greater concern, media reports have described a potential gender difference in the number of cyclists KSI, with headlines such as 'Are women cyclists in more danger than men?' (18) and 'Women cyclists are more likely to be killed in traffic: TfL suppresses report' (19), fuelling perception of an increased risk to female cyclists (20).

However, clarifying these statistics remains problematic because of difficulties in recording collisions and in reliably measuring cyclists' exposure to injury (21). The latter is particularly controversial because use of different exposure methods can affect rates of injury. Indeed the 'Road Danger Reduction Forum' recently called Transport for London's (TfL) use of overall population numbers as an exposure measure for cycling, 'disgraceful' (22). Together,

these methodological, geographical and temporal variations mean that it is currently unclear if females actually do represent a larger proportion of the total number of cyclists KSI in UK cities. Yet the question of whether this risk is real or perceived is important because it is likely that this concern is affecting some women's desire to use cycling for daily commuting and because any actual difference might offer the potential for targeted road safety campaigns.

2. AIMS AND OBJECTIVES

2.1 Aims

This project aims to investigate female cycling in London and other UK cities over the last decade. I aim to review the literature to explore the reasons for historical differences in female and male cycling uptake, before comparing the number of males and females now using cycling as a form of transport in the UK. I will then analyse the number of male and female cyclists KSI and the rates of cyclists KSI by exposure, between 2005 and 2013. I aim to compare London results with the results of nine other UK cities (Birmingham, Bradford, Bristol, Cardiff, Leeds, Leicester, Liverpool, Manchester and Sheffield) to gain an understanding of whether any changes seen are reflected nationally, before discussing these results in the context of the wider literature.

2.2 Objectives

1. **To undertake a brief critical review of the literature into:**
    a. Gender differences in cycling uptake
    b. Motivators and barriers to female cycling for transport
    c. Gender differences in risk of injury

2. **To compare the numbers of males and females using cycling as a method of transport to work in London and nine other UK cities**

3. **To compare the numbers of male and female cyclists KSI in ten UK cities, between 2005 and 2013**

4. **To compare the unadjusted rates of male and female cyclists KSI in ten UK cities, between 2005 and 2013**

5. **To compare the adjusted rates of male and female cyclists KSI in ten UK cities, between 2005 and 2013**

3. CRITICAL REVIEW OF THE BACKGROUND LITERATURE

3.1 Gender differences in cycling uptake

There is a growing body of evidence supporting the existence of differences in cycling behaviour between men and women (7). This demonstrates a difference between 'car-orientated cities with low levels of cycling', where most cyclists are young or middle-aged males, and 'cycling-friendly cities', where women are much more likely to cycle (7). Previous research suggests that London, and the UK as a whole, has been part of the former category: nationally, men make about twice as many trips annually (23) and travel four times further than females by bicycle (24), with '72% of cycle journeys being made by men in 2012/13' in London (15). Evidence from London's Cycle Hire Scheme supports this, with the findings that women made less than a fifth of all trips (25) and that their usage was lighter and dominated by leisure-orientated journeys (26). This is also in keeping with research from other countries such as Canada (27), the USA (28) and Australia (29), where women make up around 25% of all commuter cyclists (30).

However not all countries follow this pattern and in countries such as the Netherlands and Denmark female cyclists constitute up to 55% of all cyclists (31). Research also suggests that countries with low rates of utilitarian cycling have substantial gender differences in cycling, whilst those with cycling as a higher overall modal share have a smaller, or even no, gender difference (7). This variation may also be seen in cyclists' ages, with a greater age-related reduction in female cycling seen in countries with overall low rates of women cycling (7).

3.2 Motivators and barriers to female commuter cycling

Motivators and barriers to cycling are inherently personal and the literature suggests they may depend on both 'life stage' and 'circumstances' (32). For women, they are varied and can include 'intrapersonal, interpersonal, institutional, community, and environmental factors' (33). Evidence suggests that many *motivators* are similar for male and female cyclists and include enjoyment (34) and those 'related to health' and 'fitness' (30). Yet other motivators, such as those related to costs, convenience and the environment, may be more important to women than men (30). Cycling also provides more 'autonomy' and 'efficiency' to female cyclists than other forms of transport (35) and its association with a 'bourgeois sensibility' of environmental and personal health may further increase female cycling motivation (35).

However the literature suggests that the differences in *barriers* to cycling may be even more starkly 'gendered' than motivators are. Whilst much of the research into the effect of gender on cycling behaviour comes from observational studies, several main themes emerge from the literature, including: how cycling fits into women's responsibilities, cycling in relation to sense of self and femininity, and traffic and environmental safety concerns.

Several studies have explored the negative relationship between cycling and female responsibilities (34), such as the need to carry goods and passengers (34). Activities such as shopping, working and picking up children can constrain women's ability to engage in regular cycling (33). The more complicated nature of these journeys, such as the requirement to 'trip-chain' (7), may still further increase this barrier. Yet these constraints do not seem universal and appear to be reduced in countries such as the Netherlands, where women cycle as often as men and shopping trips by bicycle make up a higher proportion of total trips (31).

The idea that most cyclists are male, white and from affluent social groups (35) may be an inherent part of another barrier to female cycling: the difference between female cyclists' sense of self and the identity that 'being a cyclist' brings (35). This barrier encompasses practical aspects such as difficulties with hair, make-up and weather protection (35)(33). However it also involves more intangible ones such as feelings of 'impropriety' (35), embarrassment and the incongruity of the risk and aggression of cycling with the female sense of self (35). This barrier appears further exaggerated for women from 'Black and Asian' backgrounds (35) who may feel cycling is 'inappropriate' and 'irrelevant' because it requires exposure of their bodies, unsuitable clothing, is culturally alien and even associated with poverty (35). Research suggests that practical support, such as showers, lockers, and dress codes at work, and social influences can have a positive effect on women's engagement with cycling (33).

However the literature suggests that perhaps the greatest barrier to cycling for women is their concern about traffic and environmental safety (29), with women citing a 'greater concern for safety while cycling than men' (27). Survey evidence from Australia suggests that female cyclists are significantly more likely than men to report traffic and other motorists' aggression as constraints (30) and similar findings are reported by American (34), Canadian (27) and British studies (35). This may be because women are more risk averse than men (29) and, together, these barriers may lead to behaviour change, with research suggesting that female cyclists may be more influenced by road type than males (34), preferring to cycle on off-road paths (29). Nevertheless, overcoming these barriers, for example through

improved infrastructure, may also offer an opportunity to increase female cycling, as evidence suggests that bike-friendly environments encourage female cycling (33).

3.3 Gender differences in risk of injury

There is much debate about whether female cyclists' perceptions of cycling risk are justified or are based on 'psychological, cultural and social factors' (7). Analysis of cyclist deaths in London between 1985 and 1992 showed that around 70% were male (36) and, between 1992 and 2006, approximately a quarter were found to be female, with more female deaths in Inner London than Outer (37). More recent Transport for London (TfL) data has supported this and shown that males 'accounted for 77% of pedal cyclists casualties in 2012/13' with an average 72% of cycle journeys…made by men in 2012/13' (15). Previous research, looking at data for the whole of Great Britain, supports that most cyclist casualties are male even when allowing for greater exposure (17). However other evidence found geographical variation in the proportion of males and females injured, noting that, between 2001 and 2006, females made up 26% of fatalities in London but only 19% in Great Britain (38). Other evidence also states that there is no gender difference in cycling casualty risk when exposure is taken into account (24).

Thus the extent of any gender difference in KSI risk remains unclear, as does what might underlie any potential difference. Evidence suggests that, as in other studied areas of risk-taking behaviour, men are more likely to take risks in cycling related tasks than women (39), which may explain an increased KSI risk. However others contend that this risk aversion may in fact put female cyclists at increased risk of particular kinds of collisions, such as those when a heavy-goods vehicle (HGV) turns left into a cyclist (40), collisions which are often fatal. This may be because women misjudge the level of risk of overtaking HGVs on the right, preferring to stay on their left hand side and thereby actually increasing the risk of injury (40); this argument has fuelled public and media concern that female cyclists may be more at risk than males.

4. MATERIALS AND METHODS

4.1 Data inclusion and exclusion

In this project I have investigated the number of males and females cycling in ten UK cities for commuting purposes. Although it was not possible to know which cyclists were commuting, restricting cyclists to those of 'working age' only, offered at least a proxy measure for this and also reflects a main target group that policy aims to target to increase 'active travel'. Thus, after analysing data for all ages, subsequent analysis was for cyclists of working ages only, with all calculations performed for both male and female cyclists, to allow gender comparison.

I have analysed data from 2005 until 2013, in order to overlap with and update previous cycling reports that have reviewed data until the mid-2000s (37)(38)(17), and to include the most up-to-date data available (2014 data unpublished).

I included 33 London boroughs[1] and nine comparison cities for analysis, with results for 'Greater', 'Inner' and 'Outer London' calculated from the results of their constituent Boroughs. City comparisons were made with Birmingham, Bradford, Bristol, Cardiff, Leeds, Leicester, Liverpool, Manchester and Sheffield; these were chosen because they are the ten most densely populated District Local Authorities (DLAs) that can be clearly identified as an individual city in Census data[2]. DLAs referring to outer areas of cities, e.g. Greater Manchester, were excluded, thereby allowing this project to make direct city comparisons and because these DLAs are most likely to be affected by the policies of the city's main council alone. For analysis of city data, I primarily compared these nine cities with Inner London (i.e. ten cities) as I felt that this was most comparable to other inner city DLAs; Greater London and Outer London totals are given for information.

[1] Inner boroughs: Camden, Greenwich, Hackney, Hammersmith and Fulham, Islington, Kensington and Chelsea, Lambeth, Lewisham, Southwark, Tower Hamlets, Wandsworth, Westminster, City of London; Outer boroughs: Barking and Dagenham, Barnet, Bexley, Brent, Bromley, Croydon, Ealing, Enfield, Haringey, Harrow, Havering, Hillingdon, Hounslow, Kingston upon Thames, Merton, Newham, Redbridge, Richmond upon Thames, Sutton and Waltham Forest. The term 'borough' is treated as equivalent to 'DLA' in this project.
[2] Extracted from KS101EW (Usual resident population); available from http://www.nomisweb.co.uk/Default.asp

4.2 Sources of data

I obtained data for this project from several sources. Collision statistics were extracted from STATS19[3] (2005-2013), a data set of all accidents involving personal injury on public roads, which have been recorded by police officers. Data for cycling exposure, by DLA, were available from several sources: population estimates from Office for National Statistics (ONS) mid-year population estimates[4] (2005-2013) and the number (no.) of persons travelling to work by bicycle, from Census data[5] (2001 and 2011). Data on the average distance cycled by adults by gender per year per region (until 2012), were available from the National Travel Survey (NTS)[6], a 'household survey' that collects information on personal travel patterns in Great Britain' (41).

4.3 Data analysis methods

4.3.i Numbers of cyclists

I estimated yearly totals for 'number of persons travelling to work by bicycle' by dividing the total increase between 2001 and 2011 (Census data) by ten, to derive a yearly increase; this was then added to 2001 (for years 2005 - 2010) and 2011 data (for years 2012 - 13). The 2011 Census combines City of London data with Westminster data, thus this analysis also combined KSI STATS19 data for these two Boroughs, from 2011 onwards, to allow direct comparisons.

4.3.ii Numbers of cyclists KSI

I downloaded STATS19 data and merged police 'Accident' and 'Casualty' files. Data were then restricted to collisions involving a pedal cyclist as the casualty (Variable: Casualty Type; Code 1[7]), before further analysing the age and gender of KSI cyclists, by DLA. From this data, I calculated total numbers, means, standard deviations (SDs), standard errors (SEs) and confidence intervals (CI) for KSI cyclists and totals and means were used as a numerator for calculations of KSI rates.

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[3] Extracted from STATS19; Department of Transport Road Safety Data 2011; available at: http://data.gov.uk/dataset/road-accidents-safety-data

[4] See footnote 2

[5] Extracted from tables DC1104EW; DC7701EWIa; DC7101EWIa for 2011 data and tables S002; S119; S121 for 2001 data; available at http://www.nomisweb.co.uk/Default.asp

[6] Extracted from Table NTS9904 (two years combined); available at https://www.gov.uk/government/collections/national-travel-survey-statistics and also supplied by personal correspondence with statisticians at the National Travel Survey

[7] See footnote 3

4.3.iii KSI rate

In order to calculate rates of KSI cyclists, I used three different measures of cyclist exposure: 1) the total population of males/females in the DLA; 2) the number of people cycling to work; 3) the total miles cycled. I then calculated rates using the general formula:

$$\text{Rate} = \frac{\text{Number (no.) of events (KSI cyclists)}}{\text{Exposure: (1) total population / 2) no. of people cycling to work / 3) total distance cycled}}$$

I used these three measures because there is no single, uniformly recognised, exposure data set or method available and they therefore offered three alternative ways of calculating exposure. They also offered this project the potential to conclude that any results found are valid, regardless of exposure method used.

I calculated each of the three exposure measures, as follows:

1) I extracted population data from ONS sources (see above).

2) I extracted and estimated annual totals of no. people who cycle to work from Census data (see above).

3) As NTS data on average miles cycled per cyclist per year is only available at regional level, I extracted and used data for the region that included each city e.g. North West region data for both Liverpool and Manchester. Data is also unavailable for 2013, because changes to survey methods mean that these results are not comparable to previous years, thus I estimated average miles for 2013 by adding the average change over the previous 7 years to 2012 data. Total miles cycled were then calculated for all years and cities in two ways: 1) average male/female miles multiplied by the total male/female population for that DLA and year; 2) average male/female miles multiplied by the total males/females travelling to work by bicycle, for that DLA and year.

Thus, in total, I analysed KSI rates using four different exposure measures.

4.3.iv Statistical testing

The Wald test, assuming the Poisson distribution, was used to test the relationship between the rate of being KSI and gender, to account for possible confounding in this relationship; this was repeated using each of the four exposure measures, to allow comparison of results.

The skewed shape of the Poisson Distribution makes it appropriate for analysis of small means (42) as was the case in this data.

I analysed all data in this project using STATA13 (STATACorp, USA) and Microsoft Excel 2011 (Microsoft Corporation, USA).

4.4 Literature search

I performed a background literature search using the terms:

- Gender: “female”, “ women”, “woman”, “sex”
- Bicycle: “cycle”, “cycling”, “cyclist”, “bicycling”, “bicyclist”, “bike”, “biking”,

(with the terms “ovarian”, “hormone”, “cell” and “elite” excluded),

I searched for English language publications from 2000-2014 in: Web of Science, PubMed, the Cochrane Database of Reviews and TRID (Transport Research International Documentation) database, and performed snowball searches where relevant. I also searched some of the grey literature on cycling, including websites from CTC (the National Cycling Charity), Sustrans, the Department of Transport, Transport for London and the search engine ‘Google’.

4.5 Ethical considerations

The Research and Ethics Committee of the London School of Hygiene and Tropical Medicine granted ethical approval for this research. None of the data in this research allow identification of individuals.

5. RESULTS

5.1 Comparison of the numbers of males and females using cycling as method of transport to work in London and nine other UK cities

For males and females, the proportion of people who travelled to work by bicycle in England and Wales remained similar between 2001 and 2011. In 2001, 3.7% of males who travelled to work, over the age of 16, used a bicycle (4.1% when excluding home workers[8]) (appendix 1); by 2011, this figure had very slightly increased to 3.9% (4.4% when excluding home workers). In comparison, in 2001, 1.6% of all females used a bicycle (1.8% excluding home workers), which remained the same in 2011. In 2011, of all workers who recorded their method of travel to work as cycling, 73.2% were males and 26.8% were females, unchanged from 2001, a ratio of 2.7:1.

Table 1: Percentage (%) of males/females cycling to work (as a percentage of total males/females of all ages) in ten city comparisons and Inner and Outer London

City	Percentage of total respondents, by year of Census and gender (M/F)					
	% Males (M)			% Females (F)		
	2001	2011	Difference in %	2001	2011	Difference in %
Outer London	2.4	3.0	0.6	0.9	1.2	0.3
Inner London	4.6	8.6	4.0	2.4	4.5	2.1
Greater London	3.1	5.1	2.0	1.4	2.5	1.1
Birmingham	2.2	2.3	0.1	0.5	0.6	0.1
Bradford	1.3	1.2	-0.1	0.2	0.2	0.0
Bristol	6.6	10.0	3.4	2.3	4.6	2.3
Cardiff	4.1	5.1	1.0	1.2	2.1	0.9
Leeds	2.1	2.8	0.7	0.4	0.7	0.3
Leicester	5.9	5.2	-0.7	1.9	1.7	-0.2
Liverpool	2.9	3.3	0.3	0.5	0.7	0.2
Manchester	4.7	5.4	0.8	1.6	2.2	0.6
Sheffield	1.7	2.7	1.0	0.3	0.7	0.4

There has been a varied change in the level of cycling to work across the UK (table 1). There has been a notable increase in the proportion of both male and female cyclists in London and Bristol, with the increase in Greater London predominantly due to the increase

[8] Total respondents to question minus those who work 'mainly at home'; (Census, see footnote 5).

in Inner rather than Outer London. In 2011, for both men and women, Bristol has the highest percentage of people commuting to work by bicycle, with 10.0% of men and 4.6% of women; Inner London has the next highest totals for both, with 8.6% of men and 4.5% of women.

Leicester had the greatest difference in percentage cyclists over the decade despite having relatively high proportions cycling for both genders in 2001. Bradford had the lowest percentage of people commuting by bicycle for males and females, in both 2001 and 2011.

5.2 Comparison of the numbers of male and female cyclists KSI in London and nine other UK cities, between 2005 and 2013

5.2.i KSI cyclists in London

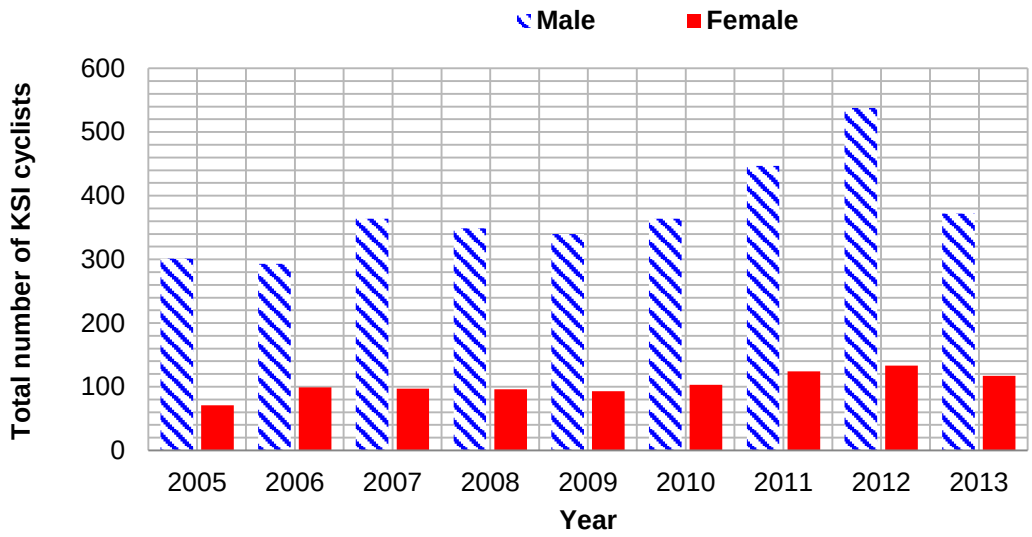
There have been 45 female and 92 male cyclists killed in Greater London between 2005 and 2013 (table 2) (per year, males: mean 10.2, SD 4.2; females: mean 5.0, SD 2.7). Across all years and injury severities, there are more males injured than females, other than for female 'fatal' injuries in 2009. There has been an overall increase in the number of cyclists KSI between 2005 and 2013 (per year, males: mean 374.2, SD 75.9; females: mean 103.7, SD 18.6) (figure 1). For both, the number increased steadily between 2009 and 2012, when it peaked, and then reduced again in 2013.

Table 2: Numbers of injured cyclists (of all ages) in Greater London by year, gender and injury severity

Year	Severity of Injury and no. of cyclists by gender (M/F)									
	Slight (no.)		KSI							
			Serious (no.)		Fatal (no.)		Total KSI (no.)			F as % of total KSI for year
	M	F	M	F	M	F	M	F	All	
2005	1977	546	283	68	18	3	301	71	372	**19.1**
2006	2010	556	282	91	11	8	293	99	392	**25.3**
2007	1953	556	353	93	11	4	364	97	461	**21.0**
2008	2128	629	338	92	11	4	349	96	445	**21.6**
2009	2502	734	337	83	3	10	340	93	433	**21.5**
2010	2756	784	358	99	6	4	364	103	467	**22.1**
2011	2974	952	437	118	10	6	447	124	571	**21.7**
2012	3078	864	525	132	13	1	538	133	671	**19.8**
2013	3197	937	363	112	9	5	372	117	489	**23.9**
TOTAL	**22575**	**6558**	**3276**	**888**	**92**	**45**	**3368**	**933**	**4301**	

The ratio of total males to females for the three categories was: fatal 2.0:1, serious 3.7:1, slight 3.4:1, suggesting that a higher proportion of 'fatal' collisions involved female cyclists. The percentage of KSI cyclists who are female has also varied ((range: 19.1% (2005) - 25.3% (2006); mean 21.8%; SD 1.9). Whilst there appears to have been a slight increase in the proportion that are female in 2013 (23.9%) there has been no consistent pattern to suggest a change in this.

Figure 1: Total numbers of KSI cyclists (of all ages) in Greater London, by year

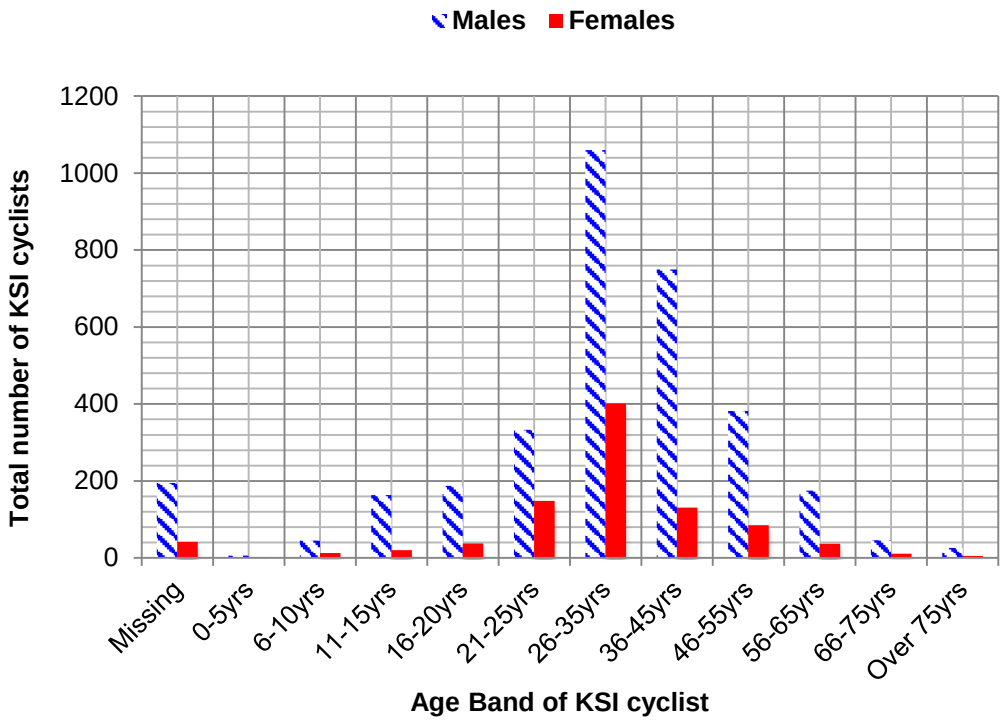


Analysis of age bands of cyclists demonstrated that, over the nine years, 90.0% of females and 85.7% of males KSI in London were between the ages of 16-65 years (appendix 2, figure 2).

As previously explained, because of the aims of this project to focus on working age cyclists, all results from this point forward refer to those cyclists between 16-64/65 years[9], unless otherwise stated.

[9] Some sources have grouped data into 16-64 years, others 16-65; source groupings have been maintained, see text for clarification of ages used for each source.

Figure 2: Annual total numbers of KSI cyclists (of all ages) in Greater London, between 2005-2013 (all years combined)



For Greater London, the mean number of KSI cyclists was 320.8 (CI 262.0- 379.6) for men and 93.3 (CI 8.3-108.4) for women. When comparing Inner London and Outer London, the number of cyclists of working age KSI is greater in Inner London across all years and for both genders (appendix 3, figure 3). However, in all years apart from 2006, Inner London females constituted a bigger percentage of Greater London female totals, than Inner London male percentages did and the increase in Inner London female cyclists KSI has been greater over the nine years than in Outer London.

There is wide variation in numbers of working age cyclists KSI across the London Boroughs (appendix 4, figure 4). For both genders, in Outer London, the greatest totals were in Richmond upon Thames; in Inner London, Westminster and Lambeth were highest. For Inner and Outer London, Boroughs with the highest numbers of KSI cyclists for one gender tended to also be the highest for the other gender.

Figure 3: Yearly total numbers of KSI cyclists (of working age) in Inner and Outer London, from 2005-2013, by gender and year

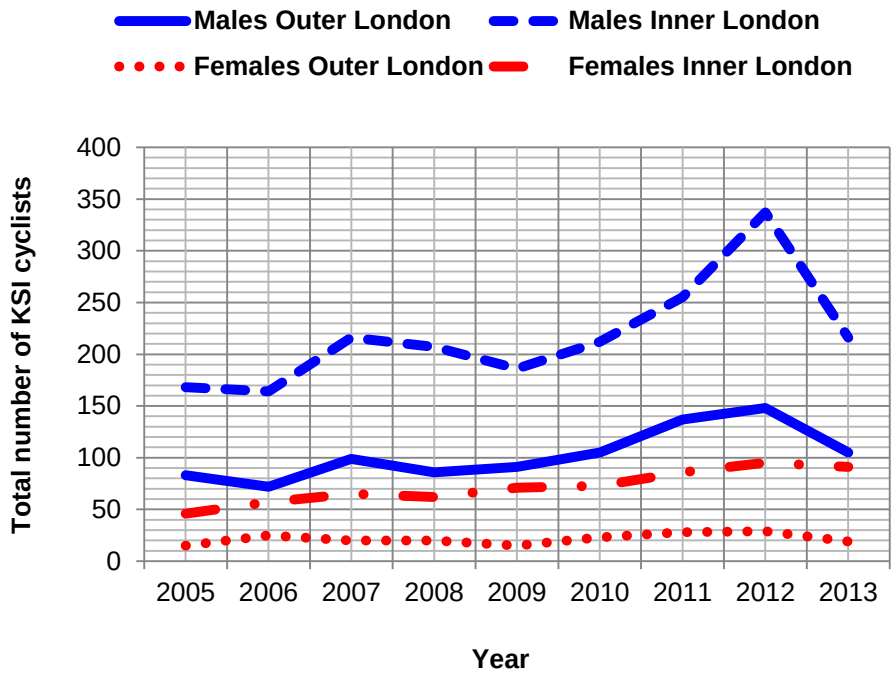
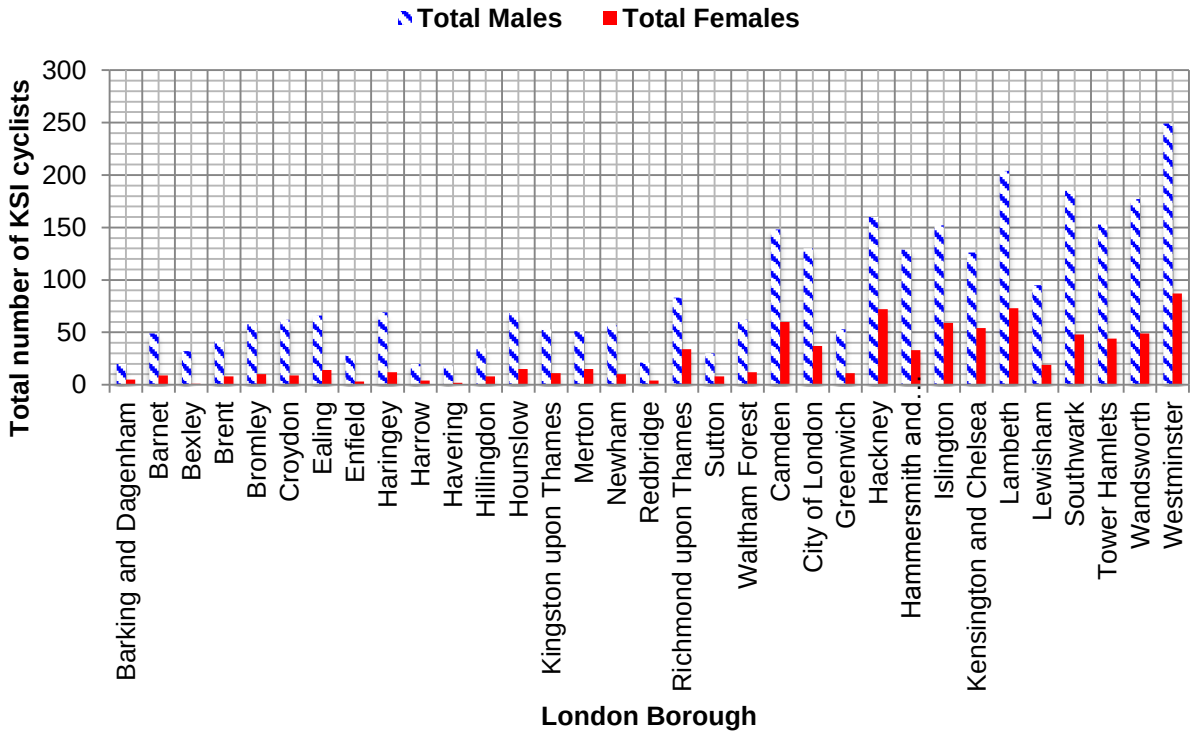


Figure 4: Total numbers of KSI cyclists (of working age) by London Borough (all years combined), by gender

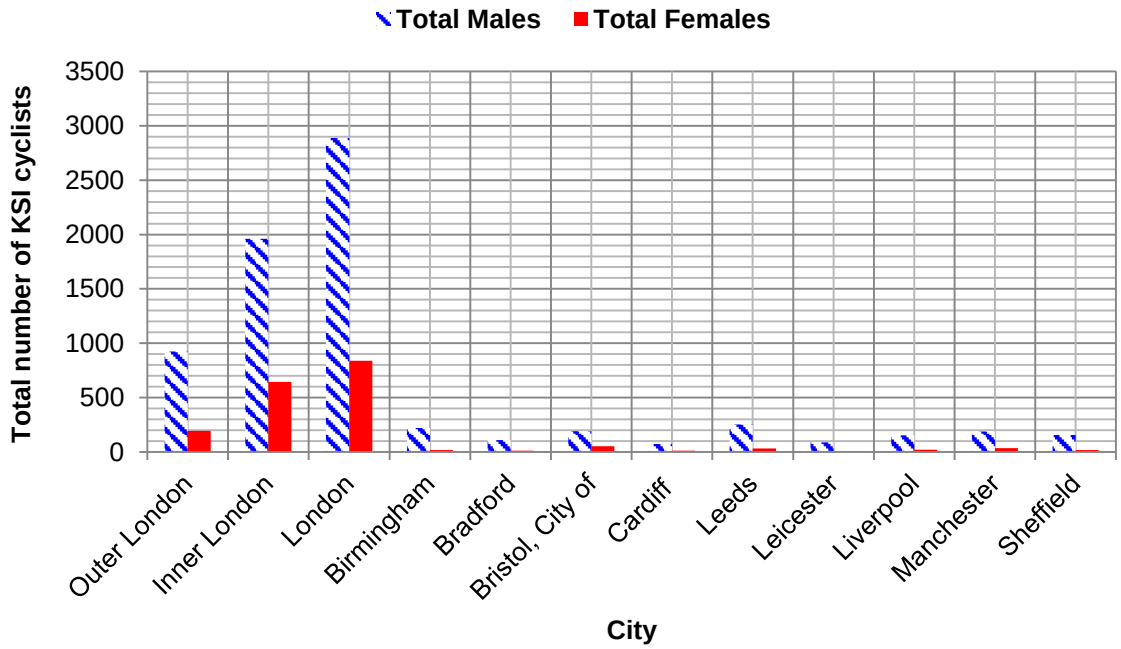


5.2.ii KSI in comparison cities

As in London, the vast majority of KSI cyclists for the nine other cities were between 16-65 years (84.7% females; 80.4% males (appendix 5)), adding weight to my decision to analyse working age cyclists only.

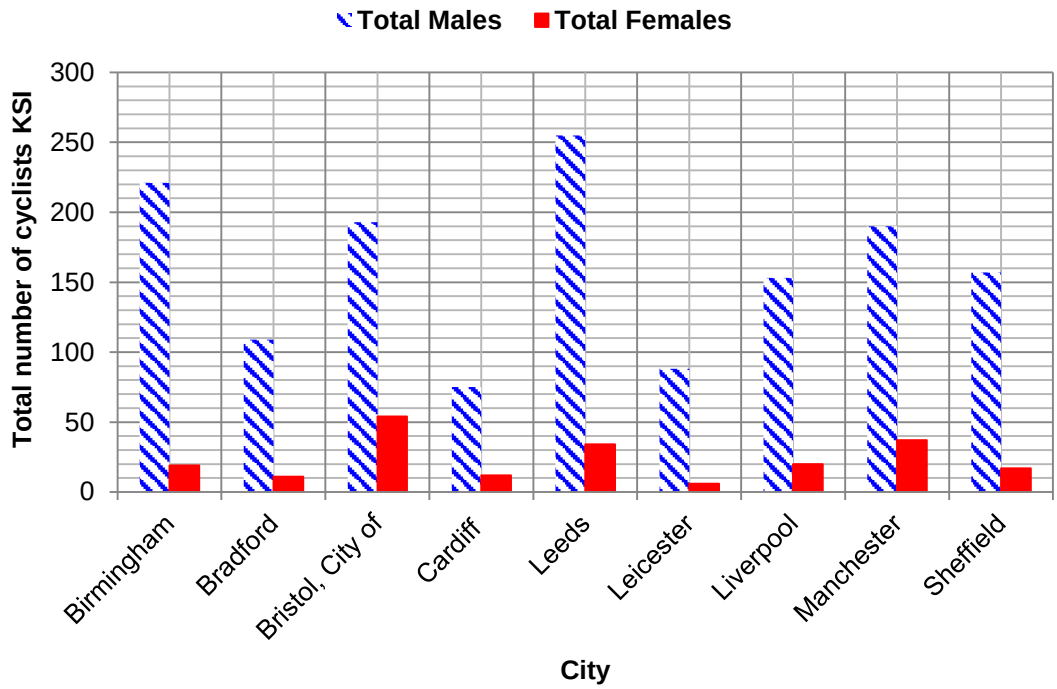
The greatest total number of KSI cyclists (of working age) was in Inner London (appendix 6, figure 5); this dwarfed the numbers in the other comparison cities. When looking at females alone, Inner London has approximately twelve times the total number (646) of females KSI than the next highest city, Bristol (54).

Figure 5: Total numbers of KSI cyclists (of working age) in ten city comparisons (all years combined)



When KSI cyclists for the nine cities are compared, with London removed (figure 6), Bristol had the highest number of women, followed by Manchester and Leeds; Leicester, Bradford and Cardiff had the lowest numbers. There are no trends apparent in the numbers of KSI female cyclists other than the general increase seen in Inner London. The lowest total proportion of males to females KSI was seen in Inner London (3.0:1) and Bristol (3.6:1) although there was considerable variation from year to year and geographically, with the highest ratio of 14.7: 1 seen in Leicester (appendix 7).

Figure 6: Total numbers of KSI cyclists (of working age) in nine city comparisons, excluding London (all years combined)



When comparing the mean number of female cyclists KSI over the nine years (appendix 8), Inner London (mean = 71.8) had more than Bristol, the next highest (mean = 6.0). The average numbers for all other cities were much lower, with Leicester the lowest (mean = 0.7). For men (appendix 9), Inner London also had the highest mean (217.9), with Leeds the next highest (28.3) and Cardiff the lowest (8.3).

5.3 Comparison of the unadjusted rate of male and female cyclists KSI in ten UK cities, between 2005 and 2013

5.3.i Using population estimates as an exposure measure

I calculated rates (numbers of male/female cyclists KSI per 100 000 men/women) (table 3, appendix 12) using mid-year population estimates (appendices 10, 11) and KSI numbers (appendix 6).

Table 3: Rates of male/female cyclists KSI per 100 000 men/women[10]

City/area	Rate, year and gender (M/F)							
	2005		2012		2013		All years average	
	M (rate)	F (rate)	M (rate)	F (rate)	M (rate)	F (rate)	M (rate)	F (rate)
Outer London	5.2	0.9	8.4	1.6	5.9	1.1	6.1	1.3
Inner London	17.3	4.7	31.3	8.8	19.8	8.3	21.0	6.9
Greater London	9.8	2.4	17.1	4.3	11.2	3.8	11.7	3.4
Birmingham	4.4	0.3	10.4	0.9	7.5	1.4	7.3	0.6
Bradford	8.4	0.6	7.9	2.4	12.2	0.6	7.5	0.8
Bristol	11.4	5.1	16.7	2.1	9.3	2.7	14.7	4.2
Cardiff	7.4	0.9	7.6	0.0	6.7	1.7	7.3	1.2
Leeds	7.4	0.4	15.6	1.6	16.4	1.2	11.4	1.5
Leicester	2.0	1.0	13.5	0.0	12.5	0.0	9.0	0.6
Liverpool	7.3	2.0	16.0	1.2	19.1	2.5	10.7	1.4
Manchester	9.3	3.2	15.1	2.8	10.7	4.0	12.0	2.4
Sheffield	9.8	1.2	9.2	1.1	9.2	2.2	9.8	1.1

Inner London had the highest rate of KSI cyclists per female population in 2013 and had the highest average KSI rate over the nine years. When looking at the average female rate, Bristol was second highest behind Inner London. Whilst Inner London also had the highest rate of KSI for males, other cities did not follow the same pattern as female rates and Liverpool and Leeds also had high 2013 male rates. However, when looking at the average rate for males, Inner London and Bristol were also the highest.

When comparing male and female rates, males have a higher rate of KSI cyclists than females with male rates more than 3 times higher for nearly all cities and years. For average values, Inner London females had a higher KSI ratio to men of 1:3, with Bristol next highest at 1:3.8.

5.3.ii Using number of people who travel to work by bicycle as an exposure measure

I calculated rates (numbers of male/female cyclists KSI per 1000 men/women who travel to work by bicycle) (table 4, appendix 17) using numbers of people who travel to work data (appendices 13, 14, 15 and 16) and KSI numbers (appendix 6).

[10] 2005, 2012, 2013 and average rates only shown; full results available in appendix 12

Table 4: Rates of male/female cyclists KSI per 1000 males/females who cycle to work)[11]

City/area	Rate, year and gender (M/F)							
	2005		2012		2013		All years average	
	M (rate)	F (rate)	M (rate)	F (rate)	M (rate)	F (rate)	M (rate)	F (rate)
Outer London	2.5	1.4	3.5	2.0	2.4	1.3	2.7	1.7
Inner London	3.8	2.2	4.6	2.8	2.8	2.5	3.6	2.5
Greater London	3.3	1.9	4.2	2.6	2.7	2.2	3.2	2.3
Birmingham	3.0	1.1	6.7	2.4	4.8	3.9	4.8	1.8
Bradford	9.4	5.7	8.7	19.5	13.2	4.8	8.3	6.3
Bristol	2.0	2.4	2.1	0.6	1.2	0.8	2.1	1.5
Cardiff	2.4	0.9	2.1	0.0	1.8	1.1	2.1	0.9
Leeds	4.3	1.3	7.4	3.5	7.5	2.5	5.8	3.8
Leicester	0.5	1.0	3.8	0.0	3.5	0.0	2.5	0.6
Liverpool	4.1	6.0	7.7	2.7	8.9	5.2	5.4	3.5
Manchester	3.3	3.3	4.3	2.1	3.0	2.9	3.7	2.0
Sheffield	6.6	3.7	4.7	2.3	4.6	4.3	5.7	2.5

Liverpool and Bradford had the highest rates of KSI cyclists per 1000 females cycling to work in 2013, with Sheffield and Birmingham next highest. Bradford stood out with the highest average female KSI rate over all the years. Leicester, Cardiff and Bristol had the lowest average rates for female cyclists and in 2013. A similar ranking of cities was seen for male totals and averages. Inner London was ranked amongst the middle cities for males and females in 2012, 2013 and in the average.

When comparing average KSI rates, males were higher across all cities and years. However for all cities, the ratio of average male to female rates are much closer than when using population as an exposure measure; with many lower than double, such as in Inner London and Bristol where the ratios are 1:1.4. There have also been several years where the female rate is greater than or equal to the male rate, such as in Manchester in 2005, Liverpool in 2005 and 2007, Birmingham and Leeds in 2006, Cardiff in 2008 and 2009, Bradford in 2010 and 2012 and Bristol in 2011.

[11] 2005, 2012, 2013 and average rates only shown; full results available in appendix 17.

5.3.iii Using distance travelled by bicycle as an exposure measure

I calculated rates (numbers of male/female KSI cyclists per annual total male/female miles cycled) (table 5, appendix 20) using KSI numbers (appendix 6) and total miles cycled, calculated in two ways (see methods; appendices 18 and 19).

Table 5: Rates of male/female cyclists KSI per 1,000 000 total male/female miles cycled annually (using population for calculation)

City/area	Rate, year and gender (M/F)							
	2005		2012		2013		All years average	
	M (rate)	F (rate)	M (rate)	F (rate)	M (rate)	F (rate)	M (rate)	F (rate)
Outer London	0.5	0.4	0.7	0.4	0.5	0.3	0.5	0.4
Inner London	1.6	1.8	2.5	2.2	1.5	2.0	1.9	2.0
Greater London	0.9	0.9	1.4	1.1	0.9	0.9	1.0	1.0
Birmingham	1.3	0.4	1.1	0.5	0.8	0.7	1.2	0.5
Bradford	1.1	0.4	0.9	1.7	1.4	0.4	0.8	0.5
Bristol	1.3	1.9	1.0	0.5	0.5	0.6	1.3	1.2
Cardiff	1.7	2.1	1.0	0.0	0.8	3.7	1.6	1.5
Leeds	0.9	0.3	1.8	1.1	1.9	0.8	1.2	0.9
Leicester	0.2	0.4	1.3	0.0	1.2	0.0	0.9	0.4
Liverpool	1.2	1.3	1.6	0.5	1.9	0.9	1.2	0.7
Manchester	1.5	2.1	1.5	1.1	1.0	1.5	1.6	1.5
Sheffield	1.2	0.8	1.1	0.8	1.1	1.6	1.3	0.6

When using total miles (calculated from the population) as a method of exposure, we can see that, in 2013, Cardiff had nearly double the rate of female KSI cyclists as the next highest city (Inner London) (table 5). However, on average over the nine years, the highest was Inner London, Cardiff, Manchester and Bristol. The lowest average rates were Leicester, Bradford and Birmingham. For males, the highest average rates were in Inner London and Manchester.

Rates (calculated from the number of people who cycle to work) (table 6), showed very different results. Bradford had the highest female KSI rates for 2013 and the highest average for males and females. Leicester and Bristol had the lowest average rates for males and females, with Inner London slightly higher.

Using this method, females also had a higher average rate of KSI than male cyclists in all ten UK cities. It is also apparent that the rate per million miles cycled are higher, when using this method rather than population numbers to calculate total miles.

Table 6: Rate of male/female cyclists KSI per 1,000 000 total male/female miles cycled annually (using no. of people who cycle to work for calculation)

City/area	Rate, year and gender (M/F)							
	2005		2012		2013		All years average	
	M (rate)	F (rate)	M (rate)	F (rate)	M (rate)	F (rate)	M (rate)	F (rate)
Outer London	23.2	54.1	27.8	50.6	18.7	30.5	23.0	49.5
Inner London	34.7	85.4	36.7	69.2	21.9	59.7	31.0	73.3
Greater London	29.8	74.8	33.4	63.7	20.7	51.2	27.8	65.8
Birmingham	90.0	138.1	73.0	134.7	47.5	200.6	80.3	152.0
Bradford	116.2	389.0	101.7	1382.1	153.5	340.5	100.1	392.8
Bristol	21.5	88.8	12.9	13.4	6.5	16.0	18.6	43.6
Cardiff	54.6	210.9	27.0	0.0	21.9	255.2	39.2	120.4
Leeds	53.0	84.8	86.3	244.7	87.4	176.9	69.5	215.7
Leicester	5.1	36.5	35.9	0.0	33.2	0.0	29.2	40.4
Liverpool	64.5	384.4	78.3	107.4	86.4	194.7	67.4	183.7
Manchester	51.6	208.0	43.8	84.1	28.6	106.4	47.9	124.8
Sheffield	81.3	253.4	55.5	160.8	53.0	306.6	70.2	154.9

5.4 Comparison of the adjusted rates of male and female cyclists KSI in ten UK cities, between 2005 and 2013

The Wald test (assuming a Poisson distribution for cyclists KSI) was used to test the relationship between number of cyclists KSI and gender, using all four exposure measures and whilst adjusting for city and year (appendix 21).

When using population as an exposure measure, comparing female with male cyclists, there is very strong evidence that the relative risk of being KSI decreases by 75% (RR 0.25, 95% ($p<0.001$, CI 0.23 – 0.27), when city and area are held constant.

When using the number of people who cycle to work as an exposure measure, comparing female with male cyclists, there is very strong evidence that the relative risk of being KSI decreases by 36% (RR 0.64, $p <0.001$, CI 0.59 – 0.69), when year and city are held constant.

When using total miles (calculated using population), comparing female with male cyclists, there is suggestive evidence that the relative risk of being KSI decreases by 7% (RR 0.93, p=0.078, CI 0.87 – 1.01), when year and city are held constant.

When using total miles (calculated using no. of people who cycle to work), comparing female with male cyclists, there is very strong evidence that the relative risk of being KSI increases by a factor of 2.2 (RR 2.16, p<0.001, CI 2.00 – 2.33), when year and city are held constant.

6. DISCUSSION

6.1 Principle findings

6.1i Numbers of people cycling to work

This project highlights that, nationally, about 1.6% of women cycle to work, less than half the proportion of males, with this proportion unchanged since 2001. The ratio of male to female cyclists is also unchanged at 73%: 27%. However this static picture belies the large geographical variation shown in this report. Bristol and Inner London have seen substantial growth in both male and female cyclists but the majority of other cities had much lower rates. In Bradford, 0.5% of women who travelled to work cycled in 2011 and in Leicester there were decreases in both males and females cycling. This widespread variation suggests that aspects of the cities themselves, perhaps such as policy, infrastructure or the perceived acceptability of cycling, may be affecting the number of women cycling. Generally, those cities where cycling uptake was higher for men also had higher female uptake.

6.1ii Numbers of cyclists KSI

In this project, I have demonstrated evidence of geographical variation in KSI numbers. The majority of those KSI in the ten cities, for males and females, were between the ages of 16-65 years. In London, working age KSI cyclist numbers have generally increased between 2005 and 2012, although for both genders, there were lower levels in 2013. It is unclear at this stage if this is an anomaly or the start of a downward trend. Generally in London, there were at least double the numbers of male cyclists KSI than females and 21.8% of all KSI cyclists were women. However the ratio was lower for fatalities and there was a greater proportion of females killed in Inner rather than Outer London.

There was wide variation in the number of cyclists KSI, for both genders, in city comparisons. The numbers of cyclists KSI in Inner London were far higher than the other cities for both females and males. Bristol and Leeds were next highest respectively; Cardiff, Leicester and Bradford had low levels for both. Results also suggested that those areas where KSI numbers were higher for men were also higher for women. For all cities, there were more males than females KSI, however the ratio of males to females was less in Bristol and Inner London than the other cities. The numbers of women KSI were too few to ascertain whether there was a trend in numbers in the nine comparison cities.

6.1iii Rates of cyclists KSI

Together, these results demonstrate that cycling uptake and KSI numbers vary by geography and gender. It seems intuitive that this might happen because exposure varies in these cities and any apparent difference in gender may be because of differences in this. However, a very different answer emerged as to why this is, depending on the method of exposure used. Using population alone, Inner London and Bristol had highest rates for males and females, and Birmingham, Bradford and Leicester had the lowest; using number of people who cycle to work, Bradford was highest, with Leicester and Cardiff lowest; using average miles and population, Inner London, Cardiff and Manchester had highest average rates with Leicester, Bradford and Birmingham lowest; whilst, using average miles and those who cycle to work, Bradford had highest female rates with Leicester, Bristol and Inner London lowest.

There was also statistically strong evidence that changing the exposure measure alters the effect of gender on KSI rate, when area and year are held constant. When population is used as a measure of exposure, comparing females to males, there is very strong evidence that the rate of being KSI decreases by 75%. However, when comparing females to males, the rate ratios increased with different exposure methods and the relative risk actually increased when total miles, using average miles and number of people who cycle to work, was used. Thus changing from one exposure method to another can alter both the direction and magnitude of risk and completely alter conclusions on whether females are more at risk than males.

Whilst there is an already strong body of opinion that the use of population data as an exposure method for cycling is flawed (43), I believe that it is likely that the use of population based data will also have a differential bias on female cyclists as, relative to their frequency in the population, they cycle less than males. This makes the use of population data even more concerning. Using an estimate of numbers of cyclists is potentially more accurate though it gives no indication of total exposure (44) and data only exists at regional level and for those who cycle to work. Exposure measures that incorporate distance travelled are most accurate (43) and the NTS uses average distance cycled and population to calculate rates[12]. In this project I have also used a modified version of this approach using number of people who cycle to work. I believe that this latter technique is theoretically most accurate as it encompasses both the number of people cycling and how much cycling they do. However,

[12] Personal telephone discussion with NTS Statisticians (18th August 2014)

this result is based on survey data, estimation of missing data and the assumption that the majority of people of working age that are commuter cycling are going to work, which is likely to be an overestimate. It is possible that exposure measures based on 'cycling to work' may even be differentially biased when comparing genders because females are known to commute less than males (26). Thus, whilst I believe that the result that relative risk increases by 2.2 when comparing female to male cyclists is likely to be an overestimate, the rate ratio based on population alone is likely to be an underestimate. The current best estimate for rate ratio between the genders is therefore likely to be closer to that calculated using total miles (population and average miles) as an exposure measure and therefore suggests that women have a slightly lower relative risk than men, when area and year are held constant.

6.2 Strengths and limitations

6.2.i Scope of research

One significant limitation of this project is in my attempt to assess commuter cycling only, and the use of 'cycling to work' as a proxy measure of this, because as many as a third of the cyclists involved in fatal collisions may have been riding 'for leisure or exercise' (38). Yet there is some evidence to suggest that 'commute modal share generally provides a reasonable proxy for total modal share' (45). I have also focussed on working age cyclists to reflect public health aims to increase 'active travel' levels and because one of the only exposure data sets available refers to number of people who cycle to work. I also felt this was most appropriate as collisions involving children and the very elderly might represent different risks, such as from inadequate parental supervision, that do not reflect more general road safety risks.

Another potential limitation of this project regards the cities I chose to study. They represent the most densely populated cities in the UK and a spread of cities across England and Wales. These cities were limited to the DLA that represents the inner city so I compared them to Inner London to represent the same type of urban environment, rather than Greater London, in which there are many suburban Boroughs. By comparing nine cities, I have increased the generalizability of results to UK cities as a whole, but my restriction to large cities has reduced the validity of results for rural areas and smaller cities, several of which are known to be 'cycling friendly' and even 'Cycling Demonstration cities' (46). This project's size constraints have also limited my ability to make a deeper comparison with international cities, as had originally been planned. I believe that to do so would have reduced the depth

of analysis and understanding about women cycling in UK cities that has been gained by this more limited focus.

6.2.ii Data limitations

One of this project's greatest strengths is its use of multiple exposure sources to explore KSI rates. To my knowledge, it is unique in this attempt and therefore offers an important insight into how these measures affect rates. However, my use of routinely collected data sources has reduced the reliability of results.

STATS19, for example, was designed to record motor vehicle collisions and has well documented limitations when used for collisions involving cyclists (43)(47), because of underreporting (48)(49) and misclassification of injuries by police officers (44). Although my comparison of cyclists to other cyclists is likely to have reduced the effect of reporting bias, it is possible that KSI rates may have been underestimated.

National Travel Survey data are also limited by small sample sizes, leading to a requirement to collate results by regions and over two years. These limitations can reduce accuracy, reflected in the fact that the NRTS (National Road Traffic Survey) and the NTS show 'different annual totals and trends' (17). However, the NRTS, another often used source of pedal cycle exposure data, does not collect any cyclist specific information, so NTS remains the only available source for exposure by gender.

The Census' large sample size and robust methodology (45) allows us to understand overall changes and trends but questions such as 'method of travel to work' may be prone to reporter bias, as cycling may be seen as a 'correct', healthy answer. However, again, it seems unlikely that these problems should affect one gender and one geographical area differentially. Further data from TfL traffic counts would have aided this research but, unfortunately, there was no response from general or individual contacts at TfL within the time frame of this project.

6.2.iii Statistical analyses

Statistical analyses in this project have helped me to quantify the weight of evidence for differences seen in results. However I have made assumptions during these analyses, such as that area and year might confound gender in Poisson calculations, and not further assessed for other potential confounders. Estimations were also made for numbers of cyclists, between the 2001 and 2011 Census and for 2013 NTS results, and I made an assumption that change in numbers would be uniform across time. Whilst this and the small

sample sizes in cities are likely to have reduced the internal validity of results, lack of available data limited the options to deal differently with these problems. However, perhaps one of the greatest weaknesses of this project was the use of regional data to represent individual city results. This represents a large assumption as, particularly in regions that contain more rural areas, such as Wales and the South West, this may not be accurate and it is possible that this may affect female data differentially, as women commute less.

6.3 Results in the context of the literature

The rates of cycling seen in this project suggest that public health policies to increase cycling have had little impact and cycling levels in England and Wales remain 'at the low end', alongside other countries such as Australia, the USA and Ireland (50). This result is in keeping with previous literature, reviewed above, that demonstrated a high female to male ratio of cyclists in UK cities (23). It is also clear that the rate of female cycling nationally, and across all our city comparisons, remains lower than international comparators such as the Netherlands (31); this is in contrast to walking, which does not show the same geographical variation (28).

Why this difference remains is unclear but it is likely that it reflects the more longstanding pro-cycling transport policies that cities with a high modal share of cycling have (50). This project also supports the idea that policy can affect cycling, as cycling uptake was highest in two cities that have invested heavily in cycling, Bristol and London. London has a strong policy aim to increase cycling and plans to spend a further £913 million on cycling over ten years (51) and Bristol too has invested heavily (£23 million) in cycling since it was named England's first and only 'Cycling City', in 2008 (52). It therefore seems unsurprising that this higher investment, policy and planning should have led to greater cycling uptake than in other cities. However it is also interesting to note that, in cities with large investment in cycling, there also appears to be less difference in the proportion of males and females cycling, which is in keeping with previously discussed findings (7). My results also agree with the previous literature that the proportion of males to females KSI varies geographically, with females making up a higher percentage of the total KSI cyclists in cities with higher cycling uptake (Inner London and Bristol) (38).

Previously published figures for injury rates suggest that the UK has a three times higher rate of cyclists injured than the Netherlands, with 5.7 cyclists injured per 10 million Km cycled in the former and 1.6 in the latter, but less than other comparable countries such as

the USA, at a rate of 33.5 (50). Whilst these figures are not directly comparable to ours, due to use of different injury definitions, age bands and exposure measures, average rates for cities in this project appear higher and fall between these quoted UK and USA rates. Interestingly, results in this project using the exposure measure of total miles (calculated using population), which is commonly used in comparisons, suggest that some cities with a higher percentage of people cycling to work, such as London, have higher KSI rates. Yet this is not in keeping with the 'Safety in Numbers' hypothesis that states that, for any one area, cycling risk decreases as cycling numbers increase, due to more awareness, lower car use and greater political will (53). This suggests that either this hypothesis may not apply to some UK city data, that cities such as London have a worryingly high KSI risk, that the 'safety in numbers' threshold has not yet been reached in these cities, or that using number of people cycling to work as an indicator of cycling levels is not as accurate as supposed.

There were no directly comparable international city rates for female KSI cyclists that were available after literature searching for this project. This may reflect the fact that few countries have as robust a survey system as the UK's Census and NTS and that there is no internationally agreed measure of exposure. Indeed many official bodies continue to quote population as a rate denominator. In one recent publication, for example, the Netherlands is reported to have the highest proportion of cycle fatalities (41%) in the EU (54), illustrating the fact that exposure measurement is particularly problematic for countries with high female cycling uptake, such as the Netherlands (55).

6.4 Implications for future research

A more detailed further analysis on the demographics of cyclists in England and Wales could add much to our understanding of how to increase cycling uptake. For example, we do not currently have information on numbers of cyclists by ethnic background or by deprivation, other than from Cycle Scheme data, and it is therefore hard to assess how significant some of the barriers to female cycling may actually be.

Our understanding of these results would also be deepened by further research into how collisions analysed in this project occurred. Evidence suggests that there may be geographical variation in the type of accident that a cyclist has, with collisions involving HGVs proportionally more frequent in London and females making up a greater proportion of cyclists killed in them (38). Further analysis of STATS19 data in these comparison cities

would help clarify if this type of collision is indeed of particular concern for females in London and whether other factors, such as time of day and weather conditions, might be important.

An extended comparison of this data with primary rather than secondary international data sources would also add insight into how female cycling in the UK compares internationally. However, unless the calls to standardise exposure methods are answered, this kind of research continues to be hampered by methodological difficulties.

6.5 Implications for public health policy

This project adds weight to the need for public health to continue to encourage policy, investment and infrastructure changes to increase cycling. The recent transfer of public health from the NHS to local government may offer an opportunity to take a local approach to this. This is supported by my findings that uptake varies geographically, which may be an effect of different funding and policies for cycling. There has also been a plateauing of cycling uptake in some cities and these DLAs need to make particular efforts to increase cycling. Whilst there is also a particular need to increase the number of women cycling, this project supports evidence that the proportion of females cycling increases as the proportion of all cyclists does (7); this suggests that public health should continue to attempt to increase cycling uptake generally, rather than specifically targeting women.

This project has confirmed that cyclist safety is still a perceived and real problem; between 2005 and 2013, in Greater London alone there were 4301 cyclists KSI, 933 of whom were women. Though these numbers remain relatively small compared to other public health priorities, cycling-related injuries are avoidable and international evidence suggests that they can be lower. Research from London also suggests that women may be at greater risk of certain types of cycling accidents and this needs further investigation and potentially targeted campaigns if found to be the case. If nothing else, reductions in KSI numbers would serve to reassure cyclists that the overall risk from cycling is low, thereby further encouraging women to cycle.

The finding that KSI rates can significantly vary depending on the exposure method used is of great public health importance because it suggests that previously published rates, which use population as a denominator, may not be accurate. In 2009 the Department of Transport recognised the need to include exposure data in assessment of cycling risk (46) and this report adds weight to the call to work towards a reliable and uniform method of measuring cyclist exposure (53). Until methods for accurately measuring cyclist numbers by gender

become available, I believe that, at the very least, rates should be based on population and average number of miles cycled. Whilst the current economic climate makes it harder to justify further investment in monitoring cycling safety, this project strongly supports the continued existence and expansion of the NTS and suggests that relatively lower-cost mechanisms, such as extending the NRTS traffic counts to include information on gender, might be helpful.

7. CONCLUSIONS

Cycling forms a major part of a wider public health drive to increase 'active travel' and evidence has confirmed that women experience health benefits at least as great as men from cycling. Yet cycling remains 'gendered' (35) and women, in particular, cite road safety as a significant barrier to cycling; thus any gender difference in injury risk, whether real or perceived, could have an effect on cycling uptake for women.

In this project I have demonstrated that, in keeping with previous evidence, the proportion of women cycling remains very low nationally but is increasing in cities such as Inner London and Bristol. However, even there, female cyclists represent a small percentage of total cyclists compared with neighbouring countries, such as the Netherlands, where male and female cycling rates are similar. My results have also confirmed that, in keeping with other studies, numbers of men KSI are greater than women and this difference is less in cities where female cycling uptake is higher.

However, perhaps the most significant outcome of this project is what it has taught us about the use of different exposure methods for calculation of KSI rates. All four methods used have inherent accuracy and reliability limitations, which affect their use as exposure denominators. Results from the currently most recognised and reliable exposure measure, population and average miles cycled, suggest that women have a slightly lower relative risk than men but that conclusion alters when other exposure measures are used; thus fears that women are more likely to be injured cannot currently be completely dismissed. I believe this project adds strong weight to the argument that there needs to be a more accurate and uniform measure of exposure to assess cycling risk. Indeed it demonstrates that this problem is actually accentuated when comparing KSI rates across genders and that, without a more reliable and widely accepted method, it is potentially dangerous to make policy recommendations based on KSI numbers or rates based on population exposure alone.

After years of increased investment and policy to support cycling, a change in Government and an altered economic climate have dramatically affected the environment within which public health bodies must now seek to increase cycling uptake and to continue to explore cycling safety. Yet this project adds weight to evidence that pro-cycling investment can potentially make a difference at individual city level. Fortunately, cycling is well supported by enthusiastic individuals and strong voluntary groups and, together with Public Health England, they must continue to put pressure on local government to maintain investment, improve cycling infrastructure and continue to monitor cycling safety. This project suggests

that investment to increase cycling uptake is likely to have a positive impact on men and women and attempts to further encourage female cycling in the UK should continue to focus on the population as a whole.

8. RECOMMENDATIONS

This project recommends that

1. bodies such as the Department of Transport, Public Health England, accident prevention and cycling societies need to urgently work together to develop a nationally agreed and recognised exposure method that allows assessment cycling risk by cyclist gender.
2. cycling rates should use an exposure method based on total miles cycled, to include an estimate of average miles and numbers of cyclists, through an expanded NTS, or by expanding the NRTS to include a measure of gender as part of cyclist counts.
3. further analysis needs to be undertaken to understand whether females are more likely to be involved in certain types of collisions, such as those involving HGVs, throughout the UK, in order to update previous analyses suggesting that they are.
4. Public Health England needs to play a more active role in highlighting the cities where cycling uptake is worse and those where rates of KSI cyclists per exposure are higher, thereby helping DLAs to learn from cities with better records of cycling uptake and safety.

9. REFERENCES

1. Cavill N, Rutter H. Health people, healthy places briefing; Obesity and the environment: increasing physical activity and active travel [Internet]. Crown Copyright; 2013. [cited 2014 Jul 24]. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/256796/Briefing_Obesity_and_active_travel_final.pdf

2. Lusk AC, Mekary RA, Feskanich D, Willett WC. Bicycle riding, walking, and weight gain in premenopausal women. Arch Intern Med [Internet]. 2010 Jun 28 [cited 2014 Jun 4];170(12):1050–6. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3119355&tool=pmcentrez&rendertype=abstract

3. Hu G, Jousilahti P, Borodulin K, Barengo NC, Lakka TA, Nissinen A, et al. Occupational, commuting and leisure-time physical activity in relation to coronary heart disease among middle-aged Finnish men and women. Atherosclerosis [Internet]. 2007 Oct [cited 2014 Jun 25];194(2):490–7. Available from: http://www.sciencedirect.com/science/article/pii/S0021915006005363

4. Matthews CE, Jurj AL, Shu X-O, Li H-L, Yang G, Li Q, et al. Influence of exercise, walking, cycling, and overall nonexercise physical activity on mortality in Chinese women. Am J Epidemiol [Internet]. 2007 Jun 15 [cited 2014 Jun 25];165(12):1343–50. Available from: http://aje.oxfordjournals.org/content/165/12/1343.long

5. Johan de Hartog J, Boogaard H, Nijland H, Hoek G. Do the health benefits of cycling outweigh the risks? Environ Health Perspect [Internet]. 2010 Aug [cited 2014 Jul 17];118(8):1109–16. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2920084&tool=pmcentrez&rendertype=abstract

6. Oja P, Titze S, Bauman A, de Geus B, Krenn P, Reger-Nash B, et al. Health benefits of cycling: a systematic review. Scand J Med Sci Sports [Internet]. 2011 Aug [cited 2014 Jul 17];21(4):496–509. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21496106

7. Jan Garrard, Susan Handy JD. Women and Cycling. In: John Pucher RB, editor. City Cycling. Cambridge, Massachusetts: Massachusetts Institute of Technology; 2012. p. 211–34.

8. Jarrett J, Woodcock J, Griffiths UK, Chalabi Z, Edwards P, Roberts I, et al. Effect of increasing active travel in urban England and Wales on costs to the National Health Service. Lancet [Internet]. 2012 Jun 9 [cited 2014 Jun 6];379(9832):2198–205. Available from: http://www.ncbi.nlm.nih.gov/pubmed/22682466

9. Lindsay G, Macmillan A, Woodward A. Moving urban trips from cars to bicycles: impact on health and emissions. Aust N Z J Public Health [Internet]. 2011 Feb [cited 2014 May 27];35(1):54–60. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21299701

10. Woodcock J, Edwards P, Tonne C, Armstrong BG, Ashiru O, Banister D, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: urban land

transport. Lancet [Internet]. 2009 Dec 5 [cited 2014 Jul 13];374(9705):1930–43. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19942277

11. SQW. Valuing the benefits of cycling; A report to Cycling England [Internet]. 2007; [cited 2014 sep 1]. Available from: http://webarchive.nationalarchives.gov.uk/20110407094607/http:/www.dft.gov.uk/cyclingengland/site/wp-content/uploads/2008/08/valuing-the-benefits-of-cycling-full.pdf

12. Association of Directors of Public Health. Take action on active travel; why a shift from car-dominated transport policy would benefit public health [Internet]. Bristol; 2008; [cited 2014 Aug 14]. Available from: http://www.fph.org.uk/uploads/Take_action_on_active_travel.pdf

13. Faculty of Public Health. Transport & Health; Briefing Statement [Internet]. [cited 2014 Sep 4]. Available from: http://www.fph.org.uk/uploads/briefing statement transport V2.pdf

14. Department of Transport. Reported Road Casualties in Great Britain: 2012 Annual Report [Internet]. 2013 [cited 2014 Sep 4]. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/245383/rrcgb2012-00.pdf

15. Transport for London. Surface Transport Fact Sheet: Surface Planning; Casualties in Greater London during 2013 [Internet]. 2013; [cited 2014 Aug 14]. Available from: http://www.tfl.gov.uk/cdn/static/cms/documents/casualties-greater-london-2012.pdf

16. Office for National Statistics. 2011 Census Analysis - Cycling to Work [Internet]. 2014 [cited 2014 Jul 24]. Available from: http://www.ons.gov.uk/ons/dcp171776_357613.pdf

17. Knowles J, Adams S, Cuerden R, Savill T, Reid S, Tight M. Collisions involving pedal cyclists on Britain's roads: establishing the causes [Internet]. 2009 [cited 2014 Jul 23]. Available from: http://www.roadsafetyobservatory.com/Evidence/Details/10845

18. Bell S. BBC NEWS | Magazine | Are women cyclists in more danger than men? [Internet]. 2009 [cited 2014 Sep 4]. Available from: http://news.bbc.co.uk/1/hi/magazine/8296971.stm

19. London School of Cycling. Women cyclists are more likely to be killed in traffic: TfL suppresses report [Internet]. rudi.net. [cited 2014 Sep 4]. Available from: http://www.rudi.net/node/16395

20. NHS Choices. Cycling safety - a special report [Internet]. 2014 [cited 2014 Jun 17]. Available from: http://www.nhs.uk/news/2014/02february/pages/cycling-safety-a-special-report.aspx

21. Poulos RG, Hatfield J, Rissel C, Grzebieta R, McIntosh AS. Exposure-based cycling crash, near miss and injury rates: the Safer Cycling Prospective Cohort Study protocol. Inj Prev [Internet]. 2012 Feb 30 [cited 2014 Sep 4];18(1):e1. Available from: http://injuryprevention.bmj.com/content/early/2011/09/30/injuryprev-2011-040160

22. Road Danger Reduction Forum. Disgraceful: TfL's "Towards a Road Safety Action Plan for London: 2020" | Road Danger Reduction Forum on WordPress.com [Internet]. 2012 [cited 2014 Jul 8]. Available from:

http://rdrf.org.uk/2012/08/27/disgraceful-tfls-towards-a-road-safety-action-plan-for-london-2020/

23. Keep M, House of Commons Library. Road cycling: statistics [Internet]. 2013; [cited 2014 Aug 27]. Available from: http://www.parliament.uk/business/publications/research/briefing-papers/SN06224/road-cycling-statistics

24. Road Safety Observatory. Synthesis title: Pedal Cyclists [Internet]; [cited 2014 Jul 28]. Available from: http://www.roadsafetyobservatory.com/Review/10090

25. Ogilvie F, Goodman A. Inequalities in usage of a public bicycle sharing scheme: socio-demographic predictors of uptake and usage of the London (UK) cycle hire scheme. Prev Med (Baltim) [Internet]. 2012 Jul [cited 2014 Aug 28];55(1):40–5. Available from: http://www.sciencedirect.com/science/article/pii/S0091743512001685

26. Beecham R, Wood J. Exploring gendered cycling behaviours within a large-scale behavioural data-set. Transp Plan Technol [Internet]. Routledge; 2013 Oct 11 [cited 2014 Jun 16];37(1):83–97. Available from: http://dx.doi.org/10.1080/03081060.2013.844903

27. Twaddle H, Hall F, Bracic B. Latent Bicycle Commuting Demand and Effects of Gender on Commuter Cycling and Accident Rates. Transp Res Rec J Transp Res Board [Internet]. 2010 [cited 2014 Jul 1];(2190). Available from: http://trid.trb.org/view/2010/C/909583

28. Pucher, J, Buehler R. Cycling for everyone: Lessons from Europe. 2007 [cited 2014 Sep 1]; Available from: http://policy.rutgers.edu/faculty/pucher/Cycling for everyone TRB.pdf

29. Garrard J, Rose G, Lo SK. Promoting transportation cycling for women: the role of bicycle infrastructure. Prev Med (Baltim) [Internet]. 2008 Jan [cited 2014 May 25];46(1):55–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/17698185

30. Heesch KC, Sahlqvist S, Garrard J. Gender differences in recreational and transport cycling: a cross-sectional mixed-methods comparison of cycling patterns, motivators, and constraints. Int J Behav Nutr Phys Act [Internet]. 2012 Jan [cited 2014 May 27];9(1):106. Available from: http://www.ijbnpa.org/content/9/1/106

31. Pucher J, Buehler R. Making Cycling Irresistible: Lessons from The Netherlands, Denmark and Germany. Transp Rev [Internet]. Routledge; 2008 Jul [cited 2014 Jul 11];28(4):495–528. Available from: http://dx.doi.org/10.1080/01441640701806612

32. Bonham J, Wilson A. Bicycling and the Life Course: The Start-Stop-Start Experiences of Women Cycling. Int J Sustain Transp [Internet]. Taylor & Francis; 2012; [cited 2014 Aug 22];6(1-6):pp 195–213. Available from: http://dx.doi.org/10.1080/15568318.2011.585219

33. Bopp M, Kaczynski AT, Campbell ME. Health-related factors associated with mode of travel to work. J Environ Public Health [Internet]. 2013 Jan [cited 2014 Jun 25];2013:242383. Available from: http://www.tandfonline.com/doi/abs/10.1080/03630242.2014.883663?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%3dpubmed#.VAhoyGRdX-A

34. Emond R C, Tang W, Handy L S. Explaining Gender Difference in Bicycling Behavior (With Discussion). Transp Res Rec J Transp Res Board [Internet]. Transportation Research Board; 2009; [cited 2014 Aug 25];(2125):pp 16–25. Available from: http://dx.doi.org/10.3141/2125-03

35. Steinbach R, Green J, Datta J, Edwards P. Cycling and the city: a case study of how gendered, ethnic and class identities can shape healthy transport choices. Soc Sci Med [Internet]. 2011 Apr [cited 2014 May 25];72(7):1123–30. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21396761

36. Gilbert K, McCarthy M. Deaths of cyclists in London 1985-92: the hazards of road traffic. BMJ [Internet]. 1994 Jun 11 [cited 2014 Jun 23];308(6943):1534–7. Available from: http://www.bmj.com/content/308/6943/1534

37. Morgan AS, Dale HB, Lee WE, Edwards PJ. Deaths of cyclists in London: trends from 1992 to 2006. BMC Public Health [Internet]. 2010 Jan [cited 2014 Jul 11];10(1):699. Available from: http://www.biomedcentral.com/1471-2458/10/699

38. Keigan, M, Cuerden R, Wheeler A. Analysis of police collision files for pedal cyclist fatalities for London, 2001-2006 [Internet]. 2009; [cited 2014 Jul 12]. Available from: http://www.tfl.gov.uk/cdn/static/cms/documents/analysis-of-police-collision-files-for-pedal-cyclist-fatalities-in-london.pdf

39. Cobey D K, Stulp G, Laan F, Buunk P A, Pollet V T. Sex Differences in Risk Taking Behavior among Dutch Cyclists. Evol Psychol [Internet]. Evolutionary Psychology Laboratory; 2013; [cited 2014 Jul 9];11(2):pp 350–364. Available from: http://www.epjournal.net/wp-content/uploads/EP11350364.pdf

40. Frings D, Rose A, Ridley AM. Bicyclist fatalities involving heavy goods vehicles: gender differences in risk perception, behavioral choices, and training. Traffic Inj Prev [Internet]. 2012 Sep [cited 2014 Jun 23];13(5):493–8. Available from: http://www.ncbi.nlm.nih.gov/pubmed/22931179

41. Department of Transport. National Travel Survey statistics [Internet]. 2013 [cited 2014 Jul 23]. Available from: https://www.gov.uk/government/collections/national-travel-survey-statistics

42. Kirkwood, B, Sterne J. Essential Medical Statistics. Second. Oxford: Blackwell Publishing; 2003.

43. OECD/International Transport Forum. Cycling, Health and Safety | OECD READ edition [Internet]. OECD Publishing/ITF,. 2013 [cited 2014 Jul 11]. Available from: http://www.keepeek.com/Digital-Asset-Management/oecd/transport/cycling-health-and-safety_9789282105955-en#page2

44. Allen, P, Bhagat, A, Francis, L, Frost, D, Kilbey, P, Noble B, Tranter M WD. Road Casualties Great Britain: 2007 Annual Report [Internet]. 2008 [cited 2014 Jul 23]. Available from: http://webarchive.nationalarchives.gov.uk/20110503151558/http:/www.dft.gov.uk/adobepdf/162469/221412/221549/227755/rcgb2007.pdf

45. Goodman A. Walking, cycling and driving to work in the English and Welsh 2011 census: trends, socio-economic patterning and relevance to travel behaviour in

general. PLoS One [Internet]. Public Library of Science; 2013 Jan 21 [cited 2014 Sep 4];8(8):e71790. Available from: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0071790#s4

46. Golbuff, L AR. Cycling Policy in the UK: a historical and thematic overview [Internet]. [cited 2014 Sep 1]. Available from: http://rachelaldred.org/wp-content/uploads/2012/10/cycling-review1.pdf

47. Agran PF, Castillo DN, Winn DG. Limitations of data compiled from police reports on pediatric pedestrian and bicycle motor vehicle events. Accid Anal Prev [Internet]. 1990 Aug [cited 2014 Jul 11];22(4):361–70. Available from: http://www.sciencedirect.com/science/article/pii/000145759090051L

48. Cryer PC. Investigation of bias after data linkage of hospital admissions data to police road traffic crash reports. Inj Prev [Internet]. 2001 Sep 1 [cited 2014 Jul 11];7(3):234–41. Available from: http://injuryprevention.bmj.com/content/7/3/234.full

49. Juhra C, Wieskötter B, Chu K, Trost L, Weiss U, Messerschmidt M, et al. Bicycle accidents - do we only see the tip of the iceberg? A prospective multi-centre study in a large German city combining medical and police data. Injury [Internet]. 2012 Dec [cited 2014 Jun 3];43(12):2026–34. Available from: http://www.ncbi.nlm.nih.gov/pubmed/22105099

50. Buehler R and Pucher J. International Overview: Cycling Trends in Western Europe, North America and Australia. In: Pucher J, Buehler R, editors. City Cycling (Urban and Industrial Environments). Cambridge: Massachusetts Institute of Technology; 2012. p. 9–30.

51. Transport for London. The Mayor's Vision For Cycling In London: An Olympic Legacy for all Londoners [Internet]. London; 2013; [cited 2014 Jul 7]. Available from: http://www.london.gov.uk/sites/default/files/Cycling Vision GLA template FINAL.pdf

52. Greater Bristol Cycling City End of Project Report [Internet]. 2011; [cited 2014 Sep 1]. Available from: http://www.betterbybike.info/sites/default/files/attachments/Cycling City end of project report.pdf

53. European Cyclists' Federation; Kuster F, Laurence C GR. Halving injury and fatality rate for cyclists by 2020 ECF Road Safety Charter [Internet]. ECF Road Safety Charter. 2010 [cited 2014 Sep 1]. Available from: http://www.ecf.com/wp-content/uploads/2011/10/ECF_Road_safety_charter.pdf

54. European Road Safety Observatory. Traffic Safety Basic Facts 2010 [Internet]. [cited 2014 Sep 1]. Available from: http://ec.europa.eu/transport/road_safety/pdf/statistics/dacota/bfs2010_dacota-kfv-1-3-main_figures.pdf

55. SWOV Fact Sheet: Road Fatalities in the Netherlands [Internet]. [cited 2014 Jun 23]. Available from: http://www.swov.nl/rapport/Factsheets/UK/FS_Road_fatalities.pdf

10. APPENDICES

All appendices are given to the nearest whole numbers for population and numbers of cyclists, one decimal place for ratios, two decimal places for means, standard errors, confidence intervals, rates and percentages, and three decimal places for probabilities.

Appendix 1: Mode of travel to work for England and Wales[13]

Year of Census	Number responding to question	Male respondents	Female respondents	Number travelling by bicycle	Males travelling by bicycle	Females travelling by bicycle
2001	23627754	12791618	10836136	650977	476010	174967
2011	26681568	14116119	12565449	744459	544895	199564

[13] Table derived from DC7101EWla - Method of travel to work (2001 specification) by sex by age for all usual residents aged 16 and over in employment the week before the census, and 2001 Census Standard Table S1119 for all people aged 16 to 74 working in the week before the Census.

Appendix 2: Age bands of KSI cyclists in Greater London, by year and gender

Age band of cyclist	No. of KSI cyclists by year and gender (M/F)																		Total M	Total F	M in age band as % of all M	F in age band as % of all F
	2005		2006		2007		2008		2009		2010		2011		2012		2013					
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F				
Missing	13	4	22	6	26	4	23	7	21	2	21	5	23	7	21	3	25	4	195	42	5.79	4.50
0-5yrs	1	0	1	0	0	0	1	1	1	0	0	0	0	0	1	1	1	0	6	2	0.18	0.21
6-10yrs	5	1	6	1	2	4	3	2	10	2	6	0	4	1	7	1	2	1	45	13	1.34	1.39
11-15yrs	24	3	22	7	15	1	24	1	25	1	15	1	12	2	14	3	12	1	163	20	4.84	2.14
16-20yrs	20	3	24	3	18	3	26	4	16	3	18	9	19	4	30	6	16	3	187	38	5.55	4.07
21-25yrs	28	11	25	5	30	14	30	16	26	18	39	14	61	28	53	18	41	24	333	148	9.89	15.86
26-35yrs	87	31	91	46	113	42	116	35	101	43	102	46	148	53	185	62	117	43	1060	401	31.47	42.98
36-45yrs	74	7	57	17	101	16	62	14	78	14	87	11	95	17	111	18	85	17	750	131	22.27	14.04
46-55yrs	24	8	24	5	41	6	36	8	43	7	53	11	45	9	73	15	43	16	382	85	11.34	9.11
56-65yrs	18	1	15	6	12	4	23	5	13	1	18	5	24	3	33	5	19	7	175	37	5.20	3.97
66-75yrs	4	0	3	2	3	3	3	2	4	2	5	1	10	0	6	1	8	0	46	11	1.37	1.18
Over 75yrs	3	2	3	1	3	0	2	1	2	0	0	0	6	0	4	0	3	1	26	5	0.77	0.54
																		Total	**3368**	**933**	**100**	**100**

Appendix 3: Number of KSI cyclists (of working age) in Outer, Inner and Greater London, by year and gender

City/area	No. of KSI cyclists by year and gender (M/F)																	
	2005		2006		2007		2008		2009		2010		2011		2012		2013	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Outer London	83	15	72	25	99	20	86	20	91	15	105	23	137	28	148	29	105	19
Inner London	168	46	164	57	216	65	207	62	186	71	212	73	255	86	337	95	216	91
Greater London	251	61	236	82	315	85	293	82	277	86	317	96	392	114	485	124	321	110
Inner London as % of Greater London	66.93	75.41	69.49	69.51	68.57	76.47	70.65	75.61	67.15	82.56	66.88	76.04	65.05	75.44	69.48	76.61	67.29	82.73

Appendix 4: Numbers of KSI cyclists (of working age) in London Boroughs, by year and gender

Borough	No. of KSI cyclists by year and gender (M/F)																				
	2005		2006		2007		2008		2009		2010		2011		2012		2013		All years total	Total M	Total F
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F			
Outer London																					
Barking and Dagenham	0	0	1	0	3	0	2	1	2	1	2	0	6	1	1	2	3	0	25	20	5
Barnet	4	0	3	0	8	0	5	0	3	0	6	1	7	2	8	3	5	3	58	49	9
Bexley	1	0	1	0	5	0	0	0	6	0	3	0	4	0	9	1	3	0	33	32	1
Brent	8	0	2	0	3	2	3	0	2	1	2	0	5	0	11	1	6	4	50	42	8
Bromley	2	0	3	0	8	3	10	0	3	1	8	1	9	1	12	2	4	2	69	59	10
Croydon	8	0	6	2	6	1	6	1	4	0	3	1	11	2	12	2	6	0	71	62	9
Ealing	4	2	8	3	6	2	6	2	12	0	10	2	7	1	8	0	5	2	80	66	14
Enfield	4	0	2	0	2	0	0	0	1	0	4	1	7	1	3	1	5	0	31	28	3
Haringey	2	2	6	5	5	0	7	0	2	1	8	0	9	2	11	0	19	2	81	69	12
Harrow	6	1	1	1	1	0	2	0	0	1	2	1	0	0	5	0	3	0	24	20	4
Havering	1	0	2	1	2	0	1	0	3	0	0	0	4	0	3	1	2	0	20	18	2
Hillingdon	4	1	2	2	7	2	2	2	4	0	4	1	4	0	5	0	3	0	43	35	8
Hounslow	10	1	7	2	7	1	8	3	4	3	8	2	6	2	10	1	9	0	84	69	15
Kingston upon Thames	4	1	6	1	4	2	5	1	7	1	6	1	12	1	9	1	0	2	64	53	11
Merton	6	2	6	0	7	1	4	4	5	1	5	0	6	2	7	5	5	0	66	51	15
Newham	2	2	5	1	5	1	7	1	8	0	10	0	8	2	7	2	5	1	67	57	10
Redbridge	2	0	2	2	3	0	0	0	3	0	3	0	3	0	4	2	1	0	25	21	4
Richmond upon Thames	4	3	6	1	9	5	9	2	12	4	11	5	13	8	10	4	9	2	117	83	34

Sutton	9	0	1	1	4	0	3	1	3	0	1	5	5	1	3	0	1	0	38	30	8
Waltham Forest	2	0	2	3	4	0	6	2	7	1	9	2	11	2	10	1	11	1	74	62	12
Total Outer London	83	15	72	25	99	20	86	20	91	15	105	23	137	28	148	29	105	19	1120	926	194
	2005		**2006**		**2007**		**2008**		**2009**		**2010**		**2011**		**2012**		**2013**		**All total**	**Total M**	**Total F**
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**			
Inner London																					
Camden	13	5	8	5	16	4	14	5	16	5	17	3	19	9	23	7	22	17	208	148	60
City of London	9	3	14	5	14	2	16	2	14	2	11	7	15	7	22	4	15	5	167	130	37
Greenwich	6	0	2	1	7	2	8	1	5	5	10	0	6	1	6	1	3	0	64	53	11
Hackney	11	4	10	5	14	5	16	11	17	6	13	8	23	15	43	12	13	6	232	160	72
Hammersmith and Fulham	17	2	18	4	13	2	14	3	16	2	9	2	12	7	22	6	8	5	162	129	33
Islington	16	5	13	3	14	7	14	2	7	9	15	8	27	5	30	12	16	8	211	152	59
Kensington and Chelsea	12	5	15	5	16	5	11	8	11	10	12	5	15	6	22	6	12	4	180	126	54
Lambeth	19	3	14	9	20	10	18	6	20	6	28	9	32	6	30	9	23	15	277	204	73
Lewisham	6	1	9	1	10	4	7	0	9	2	7	5	13	4	23	2	11	0	114	95	19
Southwark	12	2	11	7	19	2	21	4	17	8	25	8	33	7	24	6	23	4	233	185	48
Tower Hamlets	7	3	16	1	13	3	17	5	8	2	16	4	25	7	35	12	16	7	197	153	44
Wandsworth	17	8	11	3	32	4	18	3	19	2	24	5	15	7	19	7	22	10	226	177	49
Westminster	23	5	23	8	28	15	33	12	27	12	25	9	20	5	38	11	32	10	336	249	87
Total Inner London	168	46	164	57	216	65	207	62	186	71	212	73	255	86	337	95	216	91	2607	1961	646
Greater London Total	251	61	236	82	315	85	293	82	277	86	317	96	392	114	485	124	321	110	3727	2887	840

Appendix 5: Numbers of KSI cyclists (of working age) in nine cities combined (excluding London), by year and gender

Age band of cyclist	No. of KSI cyclists by year and gender (M/F)																					
	2005		2006		2007		2008		2009		2010		2011		2012		2013		All years total	Total M	Total F	M in age band as % of all F	F in age band as % of all F
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F					
MISSING	1	0	0	0	1	2	1	0	1	0	1	0	4	0	1	0	0	0	12	10	2	0.56	0.81
0-5yrs	3	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	1	1	8	6	2	0.33	0.81
6-10yrs	10	1	8	1	16	0	5	1	8	0	12	3	8	3	9	2	6	0	93	82	11	4.57	4.44
11-15yrs	26	2	39	1	27	5	21	1	14	2	24	1	29	0	26	4	14	1	237	220	17	12.27	6.85
16-20yrs	21	4	12	1	21	3	21	4	16	2	16	1	24	1	34	2	17	1	201	182	19	10.15	7.66
21-25yrs	11	2	7	2	19	5	14	4	18	2	24	7	28	9	29	3	25	5	214	175	39	9.76	15.73
26-35yrs	32	7	39	4	33	7	33	6	41	10	47	5	46	11	45	8	44	13	431	360	71	20.08	28.63
36-45yrs	33	6	40	7	23	2	34	4	50	2	49	6	50	3	39	6	63	5	422	381	41	21.25	16.53
46-55yrs	14	2	16	1	26	4	24	1	26	4	30	7	36	5	43	3	32	5	279	247	32	13.78	12.90
56-65yrs	3	1	13	1	11	1	9	0	9	0	11	2	12	1	18	1	10	1	104	96	8	5.35	3.23
66-75yrs	0	1	1	0	2	0	3	0	1	0	6	3	5	1	3	0	5	0	31	26	5	1.45	2.02
Over 75yrs	2	1	1	0	0	0	1	0	2	0	0	0	1	0	0	0	1	0	9	8	1	0.45	0.40
Total	**183**		**195**		**209**		**187**		**208**		**256**		**277**		**276**		**250**		**2041**	**1793**	**248**	**100**	**100**

Appendix 6: Numbers of KSI cyclists (of working age) in ten comparison cities, by year and gender

City/area	No. of KSI cyclists by year and gender (M/F)																				
	2005		2006		2007		2008		2009		2010		2011		2012		2013		All years total	Total M	Total F
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F			
Outer London	83	15	72	25	99	20	86	20	91	15	105	23	137	28	148	29	105	19	**1120**	926	194
Inner London	168	46	164	57	216	65	207	62	186	71	212	73	255	86	337	95	216	91	**2607**	1961	646
Greater London	251	61	236	82	315	85	293	82	277	86	317	96	392	114	485	124	321	110	**3727**	2887	840
Birmingham	14	1	10	3	20	0	26	0	29	2	29	3	31	2	36	3	26	5	**240**	221	19
Bradford	13	1	7	1	9	1	10	1	13	0	14	2	10	0	13	4	20	1	**120**	109	11
Bristol	16	7	20	2	19	7	17	5	20	7	31	6	31	13	25	3	14	4	**247**	193	54
Cardiff	8	1	11	0	8	1	5	3	5	2	10	2	11	1	9	0	8	2	**87**	75	12
Leeds	18	1	21	7	29	4	24	4	25	4	24	2	34	5	39	4	41	3	**289**	255	34
Leicester	2	1	5	0	9	2	9	1	10	1	11	0	13	1	15	0	14	0	**94**	88	6
Liverpool	11	3	11	1	7	3	10	0	16	0	19	3	22	4	26	2	31	4	**173**	153	20
Manchester	15	5	15	2	17	1	18	4	22	3	23	7	32	3	28	5	20	7	**227**	190	37
Sheffield	17	2	27	0	15	3	16	1	20	1	16	3	12	1	17	2	17	4	**174**	157	17

Appendix 7: Ratios of numbers of male to female cyclists KSI in ten city comparisons[14]

City/area	Ratio of number of male to female cyclists KSI								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**All years total**
Outer London	5.5	2.9	5.0	4.3	6.1	4.6	4.9	5.1	4.8
Inner London	3.7	2.9	3.3	3.3	2.6	2.9	3.0	3.5	3.0
Greater London	4.1	2.9	3.7	3.6	3.2	3.3	3.4	3.9	3.4
Birmingham	14.0	3.3	*	*	14.5	9.7	15.5	12.0	11.6
Bradford	13.0	7.0	9.0	10.0	*	7.0	*	3.3	9.9
Bristol	2.3	10.0	2.7	3.4	2.9	5.2	2.4	8.3	3.6
Cardiff	8.0	*	8.0	1.7	2.5	5.0	11.0	*	6.3
Leeds	18.0	3.0	7.3	6.0	6.3	12.0	6.8	9.8	7.5
Leicester	2.0	*	4.5	9.0	10.0	*	13.0	*	14.7
Liverpool	3.7	11.0	2.3	*	*	6.3	5.5	13.0	7.7
Manchester	3.0	7.5	17.0	4.5	7.3	3.3	10.7	5.6	5.1
Sheffield	8.5	*	5.0	16.0	20.0	5.3	12.0	8.5	9.2

[14] * = ratio not calculable because there were no male or female cyclists KSI in that year and city.

Appendix 8: Mean, standard errors and confidence intervals for total female cyclists KSI (all years combined)

City/area	Mean	Standard Error	Confidence Interval	
			Minimum	Maximum
Outer London	21.56	1.70	17.63	25.48
Inner London	71.78	5.45	59.21	84.34
Greater London	93.33	6.54	78.26	108.41
Birmingham	2.11	0.54	0.87	3.35
Bradford	1.22	0.40	0.30	2.15
Bristol	6.00	1.07	3.54	8.46
Cardiff	1.33	0.33	0.56	2.10
Leeds	3.78	0.57	2.46	5.10
Leicester	0.67	0.24	0.12	1.21
Liverpool	2.22	0.52	1.02	3.42
Manchester	4.11	0.70	2.51	5.72
Sheffield	1.89	1.39	0.91	2.86

Appendix 9: Mean, standard errors and confidence intervals for total male cyclists KSI (all years combined)

City/area	Mean	Standard Error	Confidence Interval	
			Minimum	Maximum
Outer London	102.89	8.33	83.67	122.10
Inner London	217.89	17.53	177.46	258.32
Greater London	320.78	25.50	261.96	379.59
Birmingham	24.56	2.79	18.12	30.99
Bradford	12.11	1.25	9.22	15.00
Bristol	21.44	2.08	16.66	26.23
Cardiff	8.33	0.75	6.61	10.05
Leeds	28.33	2.68	22.16	34.51
Leicester	9.78	1.40	6.54	13.01
Liverpool	17.0	2.71	10.76	23.24
Manchester	21.11	1.95	16.62	25.60
Sheffield	17.44	1.39	14.25	20.64

Appendix 10: Mid-year population estimates (for working ages) in London Boroughs, by year and gender

Borough	Population by year and gender (M/F)																	
	2005		2006		2007		2008		2009		2010		2011		2012		2013	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Outer London																		
Barking and Dagenham	51200	53700	51400	54100	51800	54700	52700	56100	54300	58000	56400	59800	58000	61100	58600	61900	59600	62900
Barnet	104700	111300	105500	112900	107000	114300	108700	115500	110600	117700	112300	119300	114700	120700	116300	121800	118200	122500
Bexley	68500	72100	69000	72600	69500	73300	70100	74000	70500	74400	71300	75300	71800	75900	71500	76200	72100	76800
Brent	93400	91900	95400	94100	98200	96500	101400	99300	104000	101900	106800	104000	110000	106500	110300	106400	111100	106500
Bromley	92400	97300	93300	98200	93800	99200	94500	100200	94800	100900	95200	101300	95600	101800	95800	102200	96600	103200
Croydon	109600	114100	110300	115000	111300	116600	113000	118600	114100	119700	115400	121300	117200	123700	117600	124300	118500	125200
Ealing	109900	107300	110700	108600	111700	109800	113200	111600	115200	113200	116400	114100	118200	115500	117700	115200	117500	114900
Enfield	91300	94800	91900	95900	92900	97600	94400	100000	95200	101700	96600	103900	98400	106100	99400	106200	100500	106800
Haringey	80200	80700	81500	82500	82900	83900	85700	87200	87900	89000	88800	90000	90300	90800	92100	91300	94200	92400
Harrow	72700	73400	73700	74600	74600	75400	75600	76200	76600	77600	77900	78800	78900	79500	79200	79500	79200	79200
Havering	7010	7260	7080	7330	7160	7400	7240	7470	7300	7550	7370	7620	7400	7680	7380	7700	7380	7760

	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hillingdon	82100	83300	83400	84200	84600	85200	86100	86600	87500	88200	88900	89300	91500	91400	93200	92800	94700	93900
Hounslow	77700	76700	79400	78500	81600	80300	83000	81800	85100	83300	87300	85000	89600	86700	90800	87100	91700	87500
Kingston upon Thames	52900	52500	53400	53300	53200	53700	53600	54300	53700	54700	53700	55000	54100	55400	55000	56300	55900	57000
Merton	65400	65600	66200	66600	66900	67400	67600	67900	68300	68900	68300	69100	68800	69500	68600	69700	68400	69800
Newham	87900	82100	90200	83900	94300	86500	98700	90200	103500	94100	110700	98800	117100	102500	117700	103400	118500	104800
Redbridge	81900	82300	83200	83900	84800	85600	86800	87300	88400	88900	89700	90300	92100	92200	92500	93300	93100	94600
Richmond upon Thames	61900	62400	62200	62800	61900	62700	61800	62600	61600	63000	61600	63400	61500	63500	61000	63400	61200	63600
Sutton	59000	60200	59300	60900	59600	61600	60300	62300	60900	63000	61100	63300	61500	63900	61700	64200	62100	64700
Waltham Forest	76700	76500	78300	78200	80300	80100	82900	82500	85200	84700	87800	86500	90300	88300	90500	89000	91100	89900
Total Outer London	158950	161080	160910	163410	163250	165840	166250	168890	169040	171840	171900	174470	175360	177130	176380	178120	177840	179380
Inner London																		
Camden	76700	78800	76300	79000	76300	79100	75700	78300	76600	79100	77000	79400	79400	81100	80700	82000	82700	82200
City of London	3100	2500	3200	2500	3400	2600	3300	2500	3300	2500	3200	2500	3300	2500	3300	2500	3200	2500
Greenwich	77100	78000	78500	79400	79700	80200	81100	81400	82400	82700	84500	84600	87100	86600	89000	87500	90100	88700
Hackney	7390	7590	7600	7770	7840	7950	8180	8240	8400	8510	8610	8740	8860	8990	9030	9160	9190	9350

	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hammersmith and Fulham	63200	65400	63700	66400	64400	67600	64500	67900	66200	68600	66400	68700	66900	69300	65100	67900	64300	66500
Islington	66000	68900	66500	70300	68300	71700	70000	73000	72200	74900	73700	76000	77000	78400	78900	79800	80800	81100
Kensington and Chelsea	60900	62500	59600	61400	58700	60200	58800	59900	58300	59400	57600	58700	56700	57800	54700	56300	54300	55200
Lambeth	103200	99100	104500	100600	106600	102800	108400	104800	109900	107700	110900	109300	113700	112700	116100	114800	117800	116000
Lewisham	87700	88900	88800	90500	90100	92000	91900	94500	93100	96100	93500	96500	95100	98300	96600	99900	98400	101200
Southwark	94000	92800	96800	95800	99300	98200	101200	100400	102600	103100	103900	104400	106100	106800	107600	108400	109000	110600
Tower Hamlets	78100	72300	80700	74600	84600	77800	88200	80800	92000	84500	95600	87600	99400	90700	101300	93100	104900	96300
Wandsworth	103500	107900	105400	110000	106900	111700	108000	112600	109300	114400	109900	115700	111500	117900	109800	118300	109900	118700
Westminster	86200	84000	86000	83600	84900	82000	84000	80400	82800	79100	82500	78300	83700	78400	84300	79700	86000	78800
Total Inner London	973600	977000	986000	991800	1001600	1005400	1016900	1018900	1032700	1037200	1044800	1049100	1068500	1070400	1077700	1081800	1093300	1091300

Appendix 11: Mid-year population estimates (for working ages) in ten comparison cities, by year and gender

City/area	Population by year and gender (M/F)																	
	2005		2006		2007		2008		2009		2010		2011		2012		2013	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Outer London	1589500	1610800	1609100	1634100	1632500	1658400	1662500	1688900	1690400	1718400	1719900	1744700	1753600	1771800	1763300	1781200	1778000	1793800
Inner London	973600	977000	986000	991800	1001600	1005400	1016900	1018900	1032700	1037200	1044800	1049100	1068500	1070400	1077700	1081800	1093300	1091300
Greater London	2563100	2587800	2595100	2625900	2634100	2663800	2679400	2707800	2723100	2755600	2764700	2793800	2822100	2842200	2841000	2863000	2871300	2885100
Birmingham	319500	326800	322100	329700	325600	333200	329400	336700	332300	340300	336600	344100	342100	348500	345200	351400	347000	352700
Bradford	154200	155800	155700	157400	158100	159400	160000	161400	161200	162800	163200	164300	165100	165900	164500	165200	164200	164800
Bristol	139800	137800	141600	139300	144000	140300	144900	141100	146000	142300	147400	143200	148800	144500	149600	145000	151100	146600
Cardiff	107800	109200	108900	110700	111100	112400	113100	114500	115300	116200	116600	117400	118100	118500	118400	119200	119100	120100
Leeds	244200	248600	245200	249500	246400	250700	247500	252000	247900	252300	248900	252900	249600	253100	250800	254200	250500	254300
Leicester	99600	101200	102100	103300	104600	105300	106200	106400	107700	107700	110000	109600	111100	111700	111200	112000	111800	112100
Liverpool	150700	153400	152200	154300	153900	155000	155300	155700	157300	156900	159600	158400	162000	160000	162500	161200	162200	161500
Manchester	162000	155000	165900	159000	169000	162500	171900	165500	174300	168400	178100	171400	182800	174800	185800	176700	186700	177100
Sheffield	173800	171600	174600	172700	175300	173800	177000	175900	177900	177700	180000	179900	182900	182000	184500	182800	185000	182900

Appendix 12: Rates of male/female KSI cyclists per 100 000 of male/female population

City/area	Rate of cyclists KSI, year and gender (M/F)																			
	2005		2006		2007		2008		2009		2010		2011		2012		2013		All years average	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Outer London	5.22	0.93	4.47	1.53	6.06	1.21	5.17	1.18	5.38	0.87	6.11	1.32	7.81	1.58	8.39	1.63	5.91	1.06	6.06	1.26
Inner London	17.26	4.71	16.63	5.75	21.57	6.47	20.36	6.08	18.01	6.85	20.29	6.96	23.87	8.03	31.27	8.78	19.76	8.34	21.00	6.88
London	9.79	2.36	9.09	3.12	11.96	3.19	10.94	3.03	10.17	3.12	11.47	3.44	13.89	4.01	17.07	4.33	11.18	3.81	11.73	3.38
Birmingham	4.38	0.31	3.10	0.91	6.14	0.00	7.89	0.00	8.73	0.59	8.62	0.87	9.06	0.57	10.43	0.85	7.49	1.42	7.32	0.61
Bradford	8.43	0.64	4.50	0.64	5.69	0.63	6.25	0.62	8.06	0.00	8.58	1.22	6.06	0.00	7.90	2.42	12.18	0.61	7.52	0.75
Bristol	11.44	5.08	14.12	1.44	13.19	4.99	11.73	3.54	13.70	4.92	21.03	4.19	20.83	9.00	16.71	2.07	9.27	2.73	14.67	4.22
Cardiff	7.42	0.92	10.10	0.00	7.20	0.89	4.42	2.62	4.34	1.72	8.58	1.70	9.31	0.84	7.60	0.00	6.72	1.67	7.30	1.15
Leeds	7.37	0.40	8.56	2.81	11.77	1.60	9.70	1.59	10.08	1.59	9.64	0.79	13.62	1.98	15.55	1.57	16.37	1.18	11.41	1.50
Leicester	2.01	0.99	4.90	0.00	8.60	1.90	8.47	0.94	9.29	0.93	10.00	0.00	11.70	0.90	13.49	0.00	12.52	0.00	9.00	0.63
Liverpool	7.30	1.96	7.23	0.65	4.55	1.94	6.44	0.00	10.17	0.00	11.90	1.89	13.58	2.50	16.00	1.24	19.11	2.48	10.70	1.41
Manchester	9.26	3.23	9.04	1.26	10.06	0.62	10.47	2.42	12.62	1.78	12.91	4.08	17.51	1.72	15.07	2.83	10.71	3.95	11.96	2.43
Sheffield	9.78	1.17	15.46	0.00	8.56	1.73	9.04	0.57	11.24	0.56	8.89	1.67	6.56	0.55	9.21	1.09	9.19	2.19	9.77	1.06

Appendix 13: Number of people who travel to work by bicycle in London Boroughs, by Census year and gender[15]

London Borough	No. of people by year and gender (M/F)					
	2011			2001		
	Total	M	F	Total	M	F
Outer London						
Barking and Dagenham	1077	875	202	1021	814	207
Barnet	2379	1856	523	1353	1066	287
Bexley	1280	1098	182	1041	884	157
Brent	3706	2747	959	1935	1473	462
Bromley	2197	1783	414	1332	1095	237
Croydon	2123	1728	395	1613	1372	241
Ealing	4776	3494	1282	3157	2303	854
Enfield	1911	1597	314	1437	1188	249
Haringey	5922	4230	1692	2391	1758	633
Harrow	874	685	189	851	659	192
Havering	1002	791	211	914	734	180
Hillingdon	1901	1497	404	2019	1545	474
Hounslow	4056	3006	1050	3185	2353	832
Kingston upon Thames	3292	2233	1059	2332	1620	712
Merton	3425	2570	855	2220	1685	535
Newham	2168	1698	470	1191	938	253

[15] Table derived from DC7101EWla - Method of travel to work (2001 specification) by sex by age for all usual residents aged 16 and over in employment the week before the census, and 2001 Census Standard Table S1119 for all people aged 16 to 74 working in the week before the Census

Redbridge	1362	1089	273	965	739	226
Richmond upon Thames	5875	3891	1984	3493	2279	1214
Sutton	2028	1643	385	1929	1597	332
Waltham Forest	3308	2460	848	1708	1295	413
Total Outer London	54662	40971	13691	36087	27397	8690
Inner London						
Camden	6752	4680	2072	3362	2329	1033
City of London	N/A[16]	N/A	N/A	74	55	19
Greenwich	2676	2109	567	1332	1081	251
Hackney	16411	10281	6130	4942	3165	1777
Hammersmith and Fulham	7122	4606	2516	3941	2477	1464
Islington	9775	6522	3253	3770	2499	1271
Kensington and Chelsea	3712	2542	1170	2130	1320	810
Lambeth	12945	8918	4027	5407	3694	1713
Lewisham	5178	3836	1342	2118	1672	446
Southwark	10473	7338	3135	3965	2890	1075
Tower Hamlets	7807	5375	2432	2215	1540	675
Wandsworth	12834	8901	3933	5498	3696	1802
Westminster (City of London)[17]	5347	3775	1572	2494	1638	856
Total Inner London	101032	68883	32149	41248	28056	13192

[16] Figures for City of London alone are not available for the 2011 Census; Census combines these figures with Westminster Borough for 2011.
[17] As above

Appendix 14: Number of people who travel to work by bicycle in ten cities, by Census year and gender

City/area	No. of people by year and gender (M/F)					
	2011			2001		
	All	M	F	All	M	F
Outer London	54662	40971	13691	36087	27397	8690
Inner London	101032	68883	32149	41248	28056	13192
Greater London	155694	109854	45840	77335	55453	21882
Birmingham	6476	5274	1202	5133	4358	775
Bradford	1683	1482	201	1481	1324	157
Bristol	15797	11172	4625	8106	6235	1871
Cardiff	5804	4226	1578	3514	2782	732
Leeds	6250	5141	1109	4189	3593	596
Leicester	4999	3910	1089	4463	3511	952
Liverpool	3978	3280	698	2686	2321	365
Manchester	8447	6226	2221	4610	3534	1076
Sheffield	4276	3443	833	2365	2027	338

Appendix 15: Number of people who travel to work by bicycle in London Boroughs, by Census year and gender, with figures estimated for 2002-2010 and 2012-2013

London Borough	No. of people by year and gender (M/F)																	
	2005		2006		2007		2008		2009		2010		2011		2012		2013	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Outer London																		
Barking and Dagenham	838	205	845	205	851	204	857	204	863	203	869	203	875	202	881	202	887	201
Barnet	1382	381	1461	405	1540	429	1619	452	1698	476	1777	499	1856	523	1935	547	2014	570
Bexley	970	167	991	170	1012	172	1034	175	1055	177	1077	180	1098	182	1119	185	1141	187
Brent	1983	661	2110	711	2237	760	2365	810	2492	860	2620	909	2747	959	2874	1009	3002	1058
Bromley	1370	308	1439	326	1508	343	1577	361	1645	379	1714	396	1783	414	1852	432	1921	449
Croydon	1514	303	1550	318	1586	333	1621	349	1657	364	1692	380	1728	395	1764	410	1799	426
Ealing	2779	1025	2899	1068	3018	1111	3137	1154	3256	1196	3375	1239	3494	1282	3613	1325	3732	1368
Enfield	1352	275	1393	282	1433	288	1474	295	1515	301	1556	308	1597	314	1638	321	1679	327
Haringey	2747	1057	2994	1163	3241	1268	3488	1374	3736	1480	3983	1586	4230	1692	4477	1798	4724	1904
Harrow	669	191	672	191	675	190	677	190	680	190	682	189	685	189	688	189	690	188
Havering	757	192	763	196	768	199	774	202	780	205	785	208	791	211	797	214	802	217
Hillingdon	1526	446	1521	439	1516	432	1511	425	1507	418	1502	411	1497	404	1492	397	1487	390
Hounslow	2614	919	2680	941	2745	963	2810	985	2875	1006	2941	1028	3006	1050	3071	1072	3137	1094
Kingston upon Thames	1865	851	1927	886	1988	920	2049	955	2110	990	2172	1024	2233	1059	2294	1094	2356	1128
Merton	2039	663	2128	695	2216	727	2305	759	2393	791	2482	823	2570	855	2659	887	2747	919
Newham	1242	340	1318	362	1394	383	1470	405	1546	427	1622	448	1698	470	1774	492	1850	513
Redbridge	879	245	914	250	949	254	984	259	1019	264	1054	268	1089	273	1124	278	1159	282
Richmond upon Thames	2924	1522	3085	1599	3246	1676	3407	1753	3569	1830	3730	1907	3891	1984	4052	2061	4213	2138
Sutton	1615	353	1620	359	1625	364	1629	369	1634	374	1638	380	1643	385	1648	390	1652	396
Waltham Forest	1761	587	1878	631	1994	674	2111	718	2227	761	2344	805	2460	848	2577	892	2693	935

Total Outer London	32827	10690	34184	11191	35541	11691	36899	12191	38256	12691	39614	13191	40971	13691	42328	14191	43686	14691
Inner London																		
Camden	3269	1449	3505	1553	3740	1656	3975	1760	4210	1864	4445	1968	4680	2072	4915	2176	5150	2280
Greenwich	1492	377	1595	409	1698	441	1801	472	1903	504	2006	535	2109	567	2212	599	2315	630
Hackney	6011	3518	6723	3954	7435	4389	8146	4824	8858	5259	9569	5695	10281	6130	10993	6565	11704	7001
Hammersmith and Fulham	3329	1885	3542	1990	3754	2095	3967	2200	4180	2306	4393	2411	4606	2516	4819	2621	5032	2726
Islington	4108	2064	4511	2262	4913	2460	5315	2658	5717	2857	6120	3055	6522	3253	6924	3451	7327	3649
Kensington and Chelsea	1809	954	1931	990	2053	1026	2175	1062	2298	1098	2420	1134	2542	1170	2664	1206	2786	1242
Lambeth	5784	2639	6306	2870	6828	3101	7351	3333	7873	3564	8396	3796	8918	4027	9440	4258	9963	4490
Lewisham	2538	804	2754	894	2970	984	3187	1073	3403	1163	3620	1252	3836	1342	4052	1432	4269	1521
Southwark	4669	1899	5114	2105	5559	2311	6004	2517	6448	2723	6893	2929	7338	3135	7783	3341	8228	3547
Tower Hamlets	3074	1378	3458	1554	3841	1729	4225	1905	4608	2081	4992	2256	5375	2432	5759	2608	6142	2783
Wandsworth	5778	2654	6299	2868	6819	3081	7340	3294	7860	3507	8381	3720	8901	3933	9422	4146	9942	4359
Westminster,City of London[18]	2526	1154	2734	1224	2942	1293	3150	1363	3359	1433	3567	1502	3775	1572	3983	1642	4191	1711
Total Inner London	44387	20775	48470	22671	52552	24566	56635	26462	60718	28358	64800	30253	68883	32149	72966	34045	77048	35940

[18] Westminster and City of London combined for all years

Appendix 16: Number of people who travel to work by bicycle in ten cities, by Census year and gender, with figures estimated for 2002-2010 and 2012-2013

City/area	No. of people by year and gender (M/F)																	
	2005		2006		2007		2008		2009		2010		2011		2012		2013	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Outer London	32827	10690	34184	11191	35541	11691	36899	12191	38256	12691	39614	13191	40971	13691	42328	14191	43686	14691
Inner London	44387	20775	48470	22671	52552	24566	56635	26462	60718	28358	64800	30253	68883	32149	72966	34045	77048	35940
London	77213	31465	82654	33861	88094	36257	93534	38653	98974	41048	104414	43444	109854	45840	115294	48236	120734	50632
Birmingham	4724	946	4816	989	4908	1031	4999	1074	5091	1117	5182	1159	5274	1202	5366	1245	5457	1287
Bradford	1387	175	1403	179	1419	183	1435	188	1450	192	1466	197	1482	201	1498	205	1514	210
Bristol	8210	2973	8704	3248	9197	3523	9691	3799	10185	4074	10678	4350	11172	4625	11666	4900	12159	5176
Cardiff	3360	1070	3504	1155	3648	1240	3793	1324	3937	1409	4082	1493	4226	1578	4370	1663	4515	1747
Leeds	4212	801	4367	853	4522	904	4677	955	4831	1006	4986	1058	5141	1109	5296	1160	5451	1212
Leicester	3671	1007	3711	1021	3750	1034	3790	1048	3830	1062	3870	1075	3910	1089	3950	1103	3990	1116
Liverpool	2705	498	2801	532	2896	565	2992	598	3088	631	3184	665	3280	698	3376	731	3472	765
Manchester	4611	1534	4880	1649	5149	1763	5418	1878	5688	1992	5957	2107	6226	2221	6495	2336	6764	2450
Sheffield	2593	536	2735	586	2877	635	3018	685	3160	734	3301	784	3443	833	3585	883	3726	932

Appendix 17: Rates of male/female KSI cyclists per 1000 males/females who cycle to work

City/area	Rate of cyclists KSI, year and gender (M/F)																			
	2005		2006		2007		2008		2009		2010		2011		2012		2013		All year average	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Outer London	2.53	1.40	2.11	2.23	2.79	1.71	2.33	1.64	2.38	1.18	2.65	1.74	3.34	2.05	3.50	2.04	2.40	1.29	2.67	1.70
Inner London	3.78	2.21	3.38	2.51	4.11	2.65	3.65	2.34	3.06	2.50	3.27	2.41	3.70	2.68	4.62	2.79	2.80	2.53	3.60	2.51
London	3.25	1.94	2.86	2.42	3.58	2.34	3.13	2.12	2.80	2.10	3.04	2.21	3.57	2.49	4.21	2.57	2.66	2.17	3.23	2.26
Birmingham	2.96	1.06	2.08	3.03	4.08	0.00	5.20	0.00	5.70	1.79	5.60	2.59	5.88	1.66	6.71	2.41	4.76	3.88	4.77	1.83
Bradford	9.37	5.73	4.99	5.59	6.34	5.45	6.97	5.32	8.96	0.00	9.55	10.17	6.75	0.00	8.68	19.47	13.21	4.77	8.31	6.28
Bristol	1.95	2.35	2.30	0.62	2.07	1.99	1.75	1.32	1.96	1.72	2.90	1.38	2.77	2.81	2.14	0.61	1.15	0.77	2.11	1.51
Cardiff	2.38	0.93	3.14	0.00	2.19	0.81	1.32	2.27	1.27	1.42	2.45	1.34	2.60	0.63	2.06	0.00	1.77	1.14	2.13	0.95
Leeds	4.27	1.25	4.81	8.21	6.41	4.43	5.13	4.19	5.17	3.97	4.81	1.89	6.61	4.51	7.36	3.45	7.52	2.48	5.79	3.82
Leicester	0.54	0.99	1.35	0.00	2.40	1.93	2.37	0.95	2.61	0.94	2.84	0.00	3.32	0.92	3.80	0.00	3.51	0.00	2.53	0.64
Liverpool	4.07	6.02	3.93	1.88	2.42	5.31	3.34	0.00	5.18	0.00	5.97	4.51	6.71	5.73	7.70	2.73	8.93	5.23	5.36	3.49
Manchester	3.25	3.26	3.07	1.21	3.30	0.57	3.32	2.13	3.87	1.51	3.86	3.32	5.14	1.35	4.31	2.14	2.96	2.86	3.68	2.04
Sheffield	6.56	3.73	9.87	0.00	5.21	4.72	5.30	1.46	6.33	1.36	4.85	3.83	3.49	1.20	4.74	2.27	4.56	4.29	5.66	2.54

Appendix 18: Average numbers of miles cycled per person per year (for working age cyclists), in ten cities[19]

City/area	No of miles by year and gender (M/F)																	
	2005		2006		2007		2008		2009		2010		2011		2012		2013	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
London[20]	109	26	113	30	114	25	112	29	131	36	115	45	105	49	126	40	128	42
Birmingham	33	8	35	9	46	10	53	12	52	10	67	10	80	17	92	18	100	19
Bradford	81	15	71	21	82	18	85	15	76	23	84	20	99	18	85	14	86	14
Bristol	91	27	80	20	98	36	109	41	108	30	127	40	144	44	166	46	176	48
Cardiff	44	4	45	9	35	10	45	8	70	13	66	14	78	10	76	4	81	4
Leeds	81	15	71	21	82	18	85	15	76	23	84	20	99	18	85	14	86	14
Leicester	107	27	97	21	91	16	91	16	83	15	65	9	71	12	106	17	106	16
Liverpool	63	16	71	16	71	15	87	9	78	10	65	18	73	24	98	25	103	27
Manchester	63	16	71	16	71	15	87	9	78	10	65	18	73	24	98	25	103	27
Sheffield	81	15	71	21	82	18	85	15	76	23	84	20	99	18	85	14	86	14

[19] For NTS data, working age is 16-64 years.
[20] NTS data is based on regional totals therefore London represents Greater London.

Appendix 19: Total number of miles cycled per person per year (for working age cyclists), in ten cities[21]

19a: using mid-year population estimates multiplied by average miles (to nearest whole mile)

City/area	No. of miles by year and gender (M/F)																	
	2005		2006		2007		2008		2009		2010		2011		2012		2013	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Outer London	17352803 9	41773214	18157 9529	49535824	18585 2568	41966009	18539 7234	49054916	22139 2243	62258010	19703 4797	78838344	18374 7110	87123597	22203 7081	71876021	22814 2591	76079531
Inner London	10628933 6	25336746	11126 5562	30065253	11402 7524	25441766	11340 1773	29594442	13525 3058	37577984	11969 4143	47406034	11196 0417	52634100	13570 5417	43653425	14028 5880	46284754
Greater London	27981737 5	67109960	29284 5090	79601077	29988 0092	67407775	29879 9007	78649358	35664 5301	99835995	31672 8940	12624 4378	29570 7526	13975 7698	35774 2498	11552 9446	36842 8470	12236 4286
Birmingham	1051 9610	25021 97	11352 966	28637 38	14955 438	32398 70	17366 293	38760 84	17426 716	34324 04	22412 515	33219 99	27428 855	58407 74	31719 676	62897 45	34807 934	68290 87
Bradford	1243 4185	22941 22	11027 633	32516 01	12951 682	28601 59	13599 710	24468 58	12252 372	36824 74	13660 158	33542 96	16394 491	30403 87	14045 859	23277 85	14131 627	23072 21
Bristol	1266 2006	36548 28	11320 515	28191 97	14080 253	50004 83	15822 483	58379 20	15806 569	42043 90	18787 742	57298 87	21461 252	63937 27	24781 801	66299 29	26650 969	71052 09
Cardiff	4697 855	48379 0	49187 28	10044 39	39193 05	11298 47	51278 28	95704 3	81145 67	15127 32	77055 92	16688 53	92271 87	11875 83	90279 53	53392 3	96371 88	53879 3

[21] For NTS data, working age is 16-64 years.

Leeds	1969 1491	36605 83	17366 574	51542 21	20185 291	44983 81	21037 052	38203 73	18842 202	57069 29	20833 415	51631 25	24785 372	46384 69	21414 598	35818 59	21558 908	35602 32
Leicester	1069 0867	27538 62	99119 81	21677 07	94753 15	16659 52	96706 30	16691 06	89549 61	15693 99	71135 60	95974 7	78342 91	12988 05	11780 549	19468 27	11821 787	17911 50
Liverpool	9498 135	24033 38	10862 071	24407 66	10852 929	22952 68	13560 087	14789 55	12292 048	16168 72	10333 577	28857 04	11846 954	38000 29	15979 590	41048 33	16768 253	43385 06
Manchester	1021 0337	24284 06	11839 800	25151 12	11917 772	24063 29	15009 524	15720 43	13620 496	17353 80	11531 391	31225 36	13368 045	41515 32	18270 818	44995 29	19301 066	47575 81
Sheffield	1401 4665	25267 74	12366 247	35676 71	14360 720	31185 42	15044 680	26666 81	13521 693	40195 06	15066 351	36727 81	18162 037	33354 46	15753 562	25757 82	15921 748	25606 23

19b: using numbers who cycle to work multiplied by average miles (to nearest whole number)

City/area	No. of miles by year and gender (M/F)																	
	2005		2006		2007		2008		2009		2010		2011		2012		2013	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Outer London	3583728	277236	3857507	339227	4046224	295832	4114848	354085	5010427	459790	4538204	596062	4293056	673219	5330048	572648	5605507	623090
Inner London	4845772	538757	5469560	687230	5982825	621651	6315762	768599	7952204	1027402	7423637	1367066	7217753	1580842	9187938	1373792	9886401	1524322
Greater London	8429500	815994	9327067	1026456	10029049	917483	10430610	1122683	12962631	1487193	11961842	1963128	11510809	2254061	14517986	1946439	15491908	2147412
Birmingham	155552	7242	169748	8586	225416	10027	263563	12363	266975	11262	345070	11192	422858	201455	493033	22279	547417	24927
Bradford	111859	2571	99369	3698	116229	3291	121938	2847	110241	4347	122724	4014	147163	3684	127890	2894	130266	2937
Bristol	743580	78841	695820	65734	899298	125579	1058206	157173	1102627	120376	1361066	174041	1611325	204644	1932467	224064	2144671	250854
Cardiff	146409	4742	158267	10480	128706	12460	171961	11068	277092	18340	269735	21229	330179	15814	333241	7447	365323	7838
Leeds	339658	11798	309298	17611	370430	16217	397503	14480	367222	22764	417355	21594	510503	203244	452183	16349	469098	16963
Leicester	393995	27397	360219	21415	339734	16362	345147	16439	318471	15470	250274	9416	275716	12662	418453	191668	421883	17838
Liverpool	170462	7805	199864	8407	204252	8364	261274	5681	241324	6507	206160	121099	239864	16578	331972	186222	358915	20540
Manchester	290604	24033	348271	26076	363118	26107	473110	17834	444452	20528	385683	38376	455303	52749	638712	594722	699304	65816
Sheffield	209123	7892	193710	12095	235653	11394	256542	10377	240168	16603	276334	15996	341891	15266	306072	12435	320690	13048

Appendix 20: Rates of male/female KSI cyclists per 1,000 000 total male/female miles cycled

Appendix 20a: rate, using population to calculate total miles

City/area	Rate of cyclists KSI, year and gender (M/F)																			
	2005		2006		2007		2008		2009		2010		2011		2012		2013		All year average	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Outer London	0.48	0.36	0.40	0.50	0.53	0.48	0.46	0.41	0.41	0.24	0.53	0.29	0.75	0.32	0.67	0.40	0.46	0.25	0.52	0.36
Inner London	1.58	1.82	1.47	1.90	1.89	2.55	1.83	2.09	1.38	1.89	1.77	1.54	2.28	1.63	2.48	2.18	1.54	1.97	1.80	1.95
Greater London	0.90	0.91	0.81	1.03	1.05	1.26	0.98	1.04	0.78	0.86	1.00	0.76	1.33	0.82	1.36	1.07	0.87	0.90	1.01	0.96
Birmingham	1.33	0.40	0.88	1.05	1.34	0.00	1.50	0.00	1.66	0.58	1.29	0.90	1.13	0.34	1.13	0.48	0.75	0.73	1.22	0.50
Bradford	1.05	0.44	0.63	0.31	0.69	0.35	0.74	0.41	1.06	0.00	1.02	0.60	0.61	0.00	0.93	1.72	1.42	0.43	0.91	0.47
Bristol	1.26	1.92	1.77	0.71	1.35	1.40	1.07	0.86	1.27	1.66	1.65	1.05	1.44	2.03	1.01	0.45	0.53	0.56	1.26	1.18
Cardiff	1.70	2.07	2.24	0.00	2.04	0.89	0.98	3.13	0.62	1.32	1.30	1.20	1.19	0.84	1.00	0.00	0.83	3.71	1.32	1.46
Leeds	0.91	0.27	1.21	1.36	1.44	0.89	1.14	1.05	1.33	0.70	1.15	0.39	1.37	1.08	1.82	1.12	1.90	0.84	1.36	0.85
Leicester	0.19	0.36	0.50	0.00	0.95	1.20	0.93	0.60	1.12	0.64	1.55	0.00	1.66	0.77	1.27	0.00	1.18	0.00	1.04	0.40
Liverpool	1.16	1.25	1.01	0.41	0.64	1.31	0.74	0.00	1.30	0.00	1.84	1.04	1.86	1.05	1.63	0.49	1.85	0.92	1.34	0.72
Manchester	1.47	2.06	1.27	0.80	1.43	0.42	1.20	2.54	1.62	1.73	1.99	2.24	2.39	0.72	1.53	1.11	1.04	1.47	1.55	1.45
Sheffield	1.21	0.79	2.18	0.00	1.04	0.96	1.06	0.37	1.48	0.25	1.06	0.82	0.66	0.30	1.08	0.78	1.07	1.56	1.21	0.65

Appendix 20b: rate, using number who cycle to work to calculate total miles

City/area	Rate of cyclists KSI, year and gender (M/F)																			
	2005		2006		2007		2008		2009		2010		2011		2012		2013		All years average	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Outer London	23.16	54.11	18.66	73.70	24.47	67.61	20.90	56.48	18.16	32.62	23.14	38.59	31.91	41.59	27.77	50.64	18.73	30.49	22.99	49.54
Inner London	34.67	85.38	29.98	82.94	36.10	104.56	32.78	80.67	23.39	69.11	28.56	53.40	35.33	54.40	36.68	69.15	21.85	59.70	31.04	73.26
Greater London	29.78	74.76	25.30	79.89	31.41	92.64	28.09	73.04	21.37	57.83	26.50	48.90	34.05	50.58	33.41	63.71	20.72	51.22	27.85	65.84
Birmingham	90.00	138.09	58.91	349.41	88.73	0.00	98.65	0.00	108.62	177.58	84.04	268.05	73.31	99.28	73.02	134.66	47.50	200.59	80.31	151.96
Bradford	116.22	388.96	70.44	270.43	77.43	303.88	82.01	351.24	117.92	0.00	114.08	498.29	67.95	0.00	101.65	1382.06	153.53	340.46	100.14	392.81
Bristol	21.52	88.79	28.74	30.43	21.13	55.74	16.06	31.81	18.14	58.15	22.78	34.47	19.24	63.53	12.94	13.39	6.53	15.95	18.56	43.58
Cardiff	54.64	210.87	69.50	0.00	62.16	80.25	29.08	271.05	18.04	109.05	37.07	94.21	33.32	63.23	27.01	0.00	21.90	255.16	39.19	120.42
Leeds	52.99	84.76	67.90	397.48	78.29	246.65	60.38	276.25	68.08	175.71	57.51	92.62	66.60	246.01	86.25	244.66	87.40	176.86	69.49	215.67
Leicester	5.08	36.50	13.88	0.00	26.49	122.23	26.08	60.83	31.40	64.64	43.95	0.00	47.15	78.97	35.85	0.00	33.18	0.00	29.23	40.35
Liverpool	64.53	384.35	55.04	118.94	34.27	358.69	38.27	0.00	66.30	0.00	92.16	247.74	91.72	241.29	78.32	107.40	86.37	194.74	67.44	183.68
Manchester	51.62	208.04	43.07	76.70	46.82	38.30	38.05	224.29	49.50	146.14	59.63	182.41	70.28	56.87	43.84	84.07	28.60	106.36	47.93	124.80

Sheffield	81.29	253.41	139.38	0.00	63.65	263.30	62.37	96.37	83.28	60.23	57.90	187.55	35.10	65.50	55.54	160.84	53.01	306.56	70.17	154.86

Appendix 21: Rate ratios comparing male and female KSI cyclists, over nine years and in each city (London counted once as Inner London)

Exposure measure used	Variable								
	Gender (male to female)			Year			City		
	IRR	Pr(z)	CI	IRR	Pr(z)	CI	IRR	Pr(z)	CI
Total population	0.25	<0.001	0.23 - 0.27	1.06	<0.001	1.05 -1.07	0.90	<0.001	0.89 - 0.91
No. people who cycle to work	0.64	<0.001	0.59 - 0.69	1.01	0.032	1.00 -1.02	1.01	0.030	1.00 -1.02
Total miles (average miles x population)	0.93	0.078	0.87 - 1.01	1.01	0.014	1.003 -1.03	0.95	<0.001	0.94 - 0.96
Total miles (average miles x no. people cycle to work)	2.16	<0.001	2.00- 2.33	0.97	<0.001	0.96 - 0.98	1.07	<0.001	1.06- 1.08