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ROAD SAFETY IN TWO EUROPEAN MEGACITIES: LONDON AND PARIS

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16. Abstract

This study examined road safety in two European megacities, London and Paris. Patterns of fatal crashes (both cities) and all crashes (London only) were compared with crash patterns for each respective nation as a whole. The data for London and the U.K. came from the Department for Transport, and included detailed crash data from 2005 to 2011. The data for Paris and France came from ONISR, and included summaries of fatal crashes from 2007 to 2011.

The results indicate that population demographics and traffic crashes in these two megacities tend to differ in numerous aspects when compared to the respective national averages. Traffic-crash patterns differed on aspects related to when and where crashes occur, who is involved, number of vehicles involved, weather and light conditions, and pre-crash driver actions. Similarities and differences between these two European megacities and two U.S. megacities (New York and Los Angeles) are also discussed.

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Contents

Introduction

Recent reports have documented and discussed the ever-increasing urbanization of nations around world and the resulting increase in the number of megacities (United Nations, 2012), and the potential implications for traffic safety in these megacities (Luoma, Sivak, and Zielinski, 2010). Another recent study extended the analysis in Luoma et al. and examined current crash data for two U.S. megacities (New York and Los Angeles), discussing the notable differences between these cities and the nation in general (Sivak and Bao, 2012).

As discussed in Sivak and Bao (2012), extending these analyses to other megacities of the world is contingent upon the availability of high-quality crash databases. Europe is a likely place to find such detailed data, as most nations within the European Union (E.U.) maintain relatively good traffic-crash databases. For Germany, the largest E.U. nation by population, no city is identified as a current or potential future megacity (i.e., having 10 million or more inhabitants living in a metropolitan area). Berlin, the largest city in Germany, has approximately 3.4 million inhabitants; the Berlin-Brandenburg metropolitan region has about 6 million (IKM, 2012). However, the second and third most populous E.U. nations—France and the United Kingdom, respectively—both have metropolitan areas identified as megacities (United Nations, 2012). The London "larger urban zone" (LUZ) is estimated to have 12.3 million inhabitants, while the Paris LUZ is estimated to have 11.5 million (Eurostat, 2012). Furthermore, both nations maintain publicly accessible data (or data summaries) of annual traffic crashes and fatalities, allowing for detailed comparisons between each city and its respective nation as a whole.

The present study is a follow-up to the work of Sivak and Bao (2012). The focus of the investigation is on crash patterns in the megacities of London and Paris in comparison with crash patterns for the entire United Kingdom and France, respectively. Both fatal crashes and injury crashes are of interest.

Method

Three sets of analyses were performed. The first set examined distributions of select demographic variables for London and Paris, and compared them with the distributions for the United Kingdom (U.K.) and France, respectively. The data for the U.K. came from the Department for Business, Innovation and Skills (BIS, 2012), Department for Communities and Local Government (DCLG, 2012a-2012d), Department for Transport (DfT, 2011a, 2011b), Department for Work and Pensions (DWP, 2012), Office for National Statistics (ONS, 2012a, 2012c-2012f), and Transport for London (TfL, 2011); all data for France came from the Institut National de la Statistique et des Études Économiques (INSEE, 2012a-2012g).

The second set of analyses involved examination of all police-reported crashes involving an injury in the U.K. for a seven-year period from 2005 through 2011, using detailed datasets downloaded from the Department for Transport (DfT, 2012). Comparisons were made between London and the entire U.K. A variety of variables related to the crashes, vehicles, and casualties involved were examined.

The third set of analyses examined fatal crashes in France for a five-year period from 2007 through 2011 using annual data from ONISR (ONISR, 2012). (Detailed data for non-fatal crashes were not available; data for two of the variables were only available for 2010 and 2011.) Comparisons were made between Paris and the entire nation of France. A variety of variables related to the crashes, vehicles, and fatalities involved were examined.

Table 1 lists the number of crashes examined in both sets of crash analyses.

Table 1
Number of crashes examined in the analyses of fatal crashes and all crashes.

Analysis	*2005-2011*		*2007-2011*	
	London	U.K.	Paris	France
Injury crashes	81,149	1,210,044	78,770	360,386
Persons killed	*521*	*17,830*	*700*	*21,123*
Persons injured	*93,159*	*1,625,020*	*91,667*	*453,645*

Three technical notes: (1) The data for "London" apply to the area known as Inner London (see Figure 1); the data for "Paris" apply to Paris and the "inner ring" (*petite couronne*) of departments (see Figure 2). (2) The data for the U.K. does not exclude the data for London; analogously, the data for France does not exclude Paris. (3) The U.K. includes England, Northern Ireland, Scotland, and Wales; France refers to metropolitan (or mainland) France (*France métropolitaine*).

Figure 1. The geographic area and municipalities included in the analysis for London. This includes the City of London and the 13 boroughs that comprise Inner London (ONS, 2012b).

Figure 2. The geographic area and municipalities included in the analysis for Paris. This includes the city/department of Paris, plus the three departments that comprise the "inner ring" (*petite couronne*) of Paris.

Results

Demographic aspects

Table 2 presents distributions of select demographic variables in the four geographic areas of interest (London, the U.K., Paris, and France). The main findings are as follows. Relative to the results for each nation, both London and Paris (unless noted otherwise) have the following characteristics:

- Fewer people over the age of 64
- Higher population density
- More people who were born in a foreign nation (especially for London)
- Higher level of education
- Fewer homeowners (no data available for France)
- Higher income per capita
- More people under the poverty level (London only)
- More time spent travelling to work (no data available for France)
- More households with no vehicle
- Fewer people who travel to work using a private vehicle (about half the national averages for both cities)
- More people who use public transportation (more than three times the national averages for both cities)

Table 2
Distributions of select demographic variables in the four geographical units of interest.

Demographic	London	U.K.	Paris	France
POPULATION				
Population (2010)	3,083,253	62,261,967	6,673,591	62,791,013
Population < 18	23%	24%	24%	25%
Population > 64	9%	17%	13%	17%
Females	50%	51%	52%	52%
Persons/sq km	9,656	257	8,758	114
IMMIGRATION				
Foreign born population	39%	12%	15%	6%
EDUCATION				
Higher education‡	52%†	38%†	40%	24%
HOUSING				
Homeowner	50%	65%	*	*
Persons/household	2.3	2.3	2.2	2.4
INCOME				
Income/capita	£23,846	£15,709	€25,530	€18,891
Below poverty level	32%	22%	15%	14%
TRAVEL TO WORK				
≤ 30 minutes	44%	75%	*	*
31-60 minutes	40%	20%	*	*
≥ 61 minutes	16%	5%	*	*
Mean travel time	37 min	28 min	*	*
Household with no vehicle	58%	25%	40%	20%
Private vehicle	35%	70%	30%	70%
Public transport (incl. taxis)	48%	15%	52%	14%
Walked, cycled, or other mode	16%	14%	18%	16%

‡. For the U.K.: Level 4 or higher. For France: Baccalaureate + 2 years or higher.
†. The values shown are for the Greater London statistical region and England, respectively.
*. Comparable data were not available for these variables.

Patterns of injury crashes and fatal crashes in the U.K. and London

Tables 3 through 19 present crash analyses that compare London with the entire U.K. on 17 variables. All tables include comparisons of both fatal crashes and injury crashes. (The percentages and counts for injury crashes also include fatal crashes.) The text above the tables highlights the main findings for London in relation to the entire U.K. *In this text, relative phrases (such as "more crashes") should be interpreted as involving comparisons between London and the entire U.K. (i.e., "proportionally more crashes in London than in the U.K.").* The main findings are also highlighted in color in the respective tables (red corresponds to more crashes; green corresponds to fewer crashes).

Day of the week (Table 3)

- Generally more injury crashes and more fatal crashes on weekdays.
- Fewer injury crashes and fewer fatal crashes on weekends (especially on Sunday).

Table 3
Day of the week. (The entries are percentages.)

Day	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 508)	U.K. (N = 16,479)	London (N = 81,149)	U.K. (N = 1,210,044)
Monday	14.8	12.7	14.2	14.2
Tuesday	12.0	12.7	15.5	14.9
Wednesday	15.0	12.8	15.9	15.1
Thursday	16.1	13.1	15.6	14.9
Friday	16.1	15.3	16.3	16.4
Saturday	15.6	17.4	12.4	13.5
Sunday	10.4	16.0	10.2	11.0

Crash time (Table 4)

- More injury crashes and more fatal crashes during the morning commute.

Table 4
Crash time. (The entries are percentages.)

Time	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 508)	U.K. (N = 16,479)	London (N = 81,149)	U.K. (N = 1,210,044)
6:00 – 9:59	35.4	28.9	25.8	23.7
10:00 – 15:59	26.0	28.9	31.8	35.4
16:00 – 19:59	22.2	24.4	28.7	28.9
20:00 – 5:59	16.3	17.8	13.8	12.0

Journey purpose of driver (Table 5)

- Fewer injury crashes and fewer fatal crashes commuting to or from work.
- Fewer injury crashes commuting to or from school.
- More fatal crashes involving a journey as part of work.

Table 5
Journey purpose of driver. (The entries are percentages.)

Journey purpose	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 746)	U.K. (N = 28,837)	London (N = 140,969)	U.K. (N = 2,172,192)
Journey as part of work	28.8	20.4	17.3	17.2
Commute to/from work	3.2	8.1	4.3	9.5
Commute to/from school	0.0	0.4	0.3	1.3
Other/unknown	68.0	71.1	78.0	72.0

Road type (Table 6)

- More injury crashes on single carriageways but not more fatal crashes, indicating that these crashes are generally less severe.
- More injury crashes and more fatal crashes on one-way streets.
- Fewer injury crashes on roundabouts.
- Fewer injury crashes and fewer fatal crashes on dual carriageways.

Table 6
Road type. (The entries are percentages.)

Road type	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 507)	U.K. (N = 16,418)	London (N = 81,008)	U.K. (N = 1,201,960)
Roundabout	1.4	1.6	2.7	6.7
One-way street	4.9	1.1	3.6	2.1
Dual carriageway	18.1	20.6	9.1	15.1
Single carriageway	75.1	76.1	84.4	75.1
Slip road	0.4	0.6	0.3	1.1

Location of pedestrian casualties (Table 7)

- More injury crashes and more fatal crashes within a pedestrian crossing facility.
- Fewer injury crashes with a pedestrian on the footway or verge.
- Fewer injury crashes and fewer fatal crashes in the center of the carriageway (not on a refuge, island, or reservation) or in the carriageway but not crossing.

Table 7
Location of pedestrian casualties. (The entries are percentages.)

Pedestrian location	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 275)	U.K. (N = 3,922)	London (N = 20,650)	U.K. (N = 201,856)
Crossing on pedestrian crossing facility	23.6	10.2	21.4	11.9
Crossing outside of crossing facility (including crossing within the 'zig-zag' approach or exit lines)	55.6	52.9	58.1	57.2
On footway or verge	8.0	7.9	6.2	10.1
On refuge, central island or central reservation	0.7	0.8	0.4	0.5
In center of carriageway; not on refuge, island or central reservation	0.0	5.1	1.0	3.0
In carriageway, not crossing	5.8	15.1	6.9	10.4
Other or unknown	6.2	8.1	6.1	7.1

Vehicle type (Table 8)

- More injury crashes and more fatal crashes involving cycles (both motor and bicycle).
- More injury crashes and more fatal crashes involving busses and similar vehicles.
- Fewer injury crashes and fewer fatal crashes for cars or taxis.

Table 8
Vehicle type. (The entries are percentages.)

Vehicle type	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 746)	U.K. (N = 29,480)	London (N = 140,969)	U.K. (N = 2,216,726)
Bicycle	11.0	3.2	12.1	5.5
Motorcycle	19.4	13.1	14.8	7.2
Car or taxi	39.7	64.5	58.5	75.8
Bus, coach, minibus, or tram	10.9	2.7	6.6	2.9
Van or goods vehicle (all sizes)	15.3	14.5	7.3	7.4
Other vehicle type	3.8	1.9	0.7	1.1

Casualties by road user type (Table 9)

- More injury crashes and more fatal crashes with a pedestrian or bicyclist as a casualty.
- More injury crashes for motorcycle users, but no substantial difference in fatal crashes, indicating that motorcycle crashes tend to be less severe.
- More injury crashes with a bus (or similar vehicle) occupant as a casualty, but no difference in fatal crashes, indicating that these crashes tend to be less severe.
- Fewer injury crashes and fewer fatal crashes with a car, taxi, van, or goods-vehicle occupant as a casualty.

Table 9
Casualties by road user type. (The entries are percentages.)

Road user type	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 521)	U.K. (N = 17,830)	London (N = 93,680)	U.K. (N = 1,642,850)
Pedestrian	52.8	22.0	22.0	12.3
Bicyclist	14.6	4.9	17.4	7.2
Motorcycle rider or passenger	20.7	19.6	19.7	9.3
Car or taxi occupant	10.7	48.9	32.4	64.3
Bus, coach, minibus, or tram occupant	0.6	0.7	6.5	3.3
Van or goods-vehicle (all sizes) occupant	0.2	3.1	1.6	3.1
Other vehicle occupant or rider	0.4	1.0	0.3	0.6

Casualty type (Table 10)

- More injury crashes and fatal crashes with a pedestrian casualty.
- Fewer injury crashes and fewer fatal crashes with a passenger casualty.
- Fewer fatal crashes with a driver or rider casualty.

Table 10
Casualty type. (The entries are percentages.)

Casualty type	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 521)	U.K. (N = 17,830)	London (N = 93,680)	U.K. (N = 1,642,850)
Driver or rider	42.4	60.1	61.3	62.7
Passenger	4.8	17.9	16.7	25.0
Pedestrian	52.8	22.0	22.0	12.3

Sex of driver (Table 11)

- More injury crashes and more fatal crashes involving male drivers (and vice versa for female drivers).

Table 11
Sex of driver. (The entries are percentages.)

Sex	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 699)	U.K. (N = 28,576)	London (N = 131,143)	U.K. (N = 2,090,890)
Male	87.0	82.6	80.4	70.0
Female	13.0	17.4	19.6	30.0

Age band of driver (Table 12)

- More injury crashes and more fatal crashes involving drivers 26 to 45 years old.
- Fewer injury crashes and fewer fatal crashes involving drivers 16 to 20 years old.
- Fewer injury crashes and fewer fatal crashes involving drivers over 65 years old.

Table 12
Age band of driver. (The entries are percentages.)

Age band	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 642)	U.K. (N = 28,062)	London (N = 110,498)	U.K. (N = 1,197,893)
15 or younger	0.6	0.5	0.6	1.3
16 – 20	4.7	10.9	4.7	11.8
21 – 25	12.3	12.0	11.9	12.6
26 – 35	27.3	19.6	31.7	22.6
36 – 45	25.4	21.0	26.6	21.9
46 – 55	17.1	16.5	15.3	15.0
56 – 65	9.0	10.7	6.6	9.0
66 or older	3.6	8.8	2.6	5.9

Sex of casualty (Table 13)

- More injury crashes but fewer fatal crashes with a male as a casualty (and vice versa for females).
- These two trends indicate that crashes involving male casualties are less severe than in the rest of the U.K.

Table 13
Sex of casualty. (The entries are percentages.)

Sex	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 521)	U.K. (N = 17,830)	London (N = 93,680)	U.K. (N = 1,642,850)
Male	66.6	74.9	66.2	58.1
Female	33.4	25.1	33.8	41.9

Age band of casualty (Table 14)

- Fewer injury crashes but more fatal crashes for casualties 0 to 10 years old, indicating that crashes involving that age group tend to be more severe.
- Fewer injury crashes and fewer fatal crashes involving casualties 11 to 20 years old.
- More injury crashes and more fatal crashes involving casualties 26 to 45 years old.
- Fewer injury crashes but not fewer fatal crashes involving casualties 56 or older, indicating that these types of crashes tend to be more severe.

Table 14
Age band of casualty. (The entries are percentages.)

Age band	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 519)	U.K. (N = 17,380)	London (N = 86,617)	U.K. (N = 1,606,259)
0 – 5	1.7	0.9	1.5	1.8
6 – 10	1.3	1.0	2.1	3.0
11 – 15	1.7	2.3	3.2	5.1
16 – 20	6.2	15.0	7.2	15.9
21 – 25	12.9	12.2	13.2	12.8
26 – 35	20.6	15.9	30.4	19.0
36 – 45	19.3	14.6	21.0	16.8
46 – 55	10.2	11.5	11.5	11.5
56 – 65	7.5	8.0	5.3	7.1
66 or older	18.5	18.5	4.6	7.1

Number of vehicles involved (Table 15)

- More injury crashes involving one vehicle, but substantially more fatal crashes. This pattern indicates that single-vehicle crashes tend to be more severe.
- More injury crashes involving two vehicles, but fewer fatal crashes, indicating that these crashes are generally less severe.
- Fewer multivehicle injury crashes and fewer fatal crashes.

Table 15
Number of vehicles involved. (The entries are percentages.)

Number of vehicles	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 508)	U.K. (N = 16,479)	London (N = 81,149)	U.K. (N = 1,210,044)
1 vehicle	61.2	45.0	32.7	30.4
2 vehicles	32.3	39.7	62.1	59.2
3 vehicles	5.5	10.4	4.4	8.1
4 or more vehicles	1.0	4.8	0.9	2.3

Posted speed limit (Table 16)

- More injury crashes and more fatal crashes on roads with speed limit 30 mph or less.
- Fewer injury crashes and fewer fatal crashes on roads with speed limits of 40 mph or more.
- These two patterns are likely due to the distribution of speed limits within London versus the rest of the U.K.

Table 16
Posted speed limit. (The entries are percentages.)

Speed limit	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 508)	U.K. (N = 16,479)	London (N = 81,149)	U.K. (N = 1,210,044)
Less than 30 mph	0.8	0.4	0.2	0.8
30 mph	95.5	32.6	97.9	63.8
40 mph	2.2	9.3	1.0	8.2
50 mph	1.6	5.0	0.8	3.0
More than 50 mph	0.0	52.7	0.1	24.2

Weather conditions (Table 17)

- More injury crashes and more fatal crashes in clear weather.
- Fewer injury crashes and fewer fatal crashes in rain, snow, fog, or mist.

Table 17
Weather conditions. (The entries are percentages.)

Weather	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 504)	U.K. (N = 16,254)	London (N = 80,582)	U.K. (N = 1,185,900)
Fine (clear)	91.1	85.6	88.1	82.6
Rain or snow	7.7	11.8	10.6	14.3
Fog or mist	0.2	0.9	0.1	0.6
Other	0.4	1.7	1.1	2.5

Road surface condition (Table 18)

- More injury crashes and more fatal crashes on dry roads.
- Fewer injury crashes and fewer fatal crashes on wet or damp roads and on snowy roads.
- Fewer injury crashes and fewer fatal crashes on frosty or icy roads.

Table 18
Road surface conditions. (The entries are percentages.)

Road condition	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 508)	U.K. (N = 16,470)	London (N = 81,146)	U.K. (N = 1,208,631)
Dry	84.8	66.9	82.1	68.6
Wet or damp	14.4	30.7	17.1	28.4
Frost or ice	0.8	1.7	0.5	0.7
Snow	0.0	0.4	0.2	2.2
Flood (> 3 cm deep)	0.0	0.2	0.0	0.1

Light conditions (Table 19)

- More injury crashes and more fatal crashes in dark but lighted conditions.
- Fewer injury crashes and fewer fatal crashes in dark, unlighted conditions.
- These two patterns are likely due to the distribution of lighted and unlighted roads within London versus the rest of the U.K.

Table 19
Light conditions. (The entries are percentages.)

Light condition	FATAL CRASHES		ALL INJURY CRASHES	
	London (N = 508)	U.K. (N = 16,479)	London (N = 81,149)	U.K. (N = 1,210,044)
Daylight	60.8	58.1	70.1	73.2
Darkness – lighted	38.4	21.3	29.3	19.7
Darkness – all other	0.8	20.5	0.6	7.1

Patterns of fatal crashes in France and Paris

Tables 20 through 22 present crash analyses that compare Paris with the entire nation on 10 variables. All tables include comparisons of fatal crashes only. (Detailed data for injury crashes were not available.) The text above the tables highlights the main findings for Paris in relation to the entire nation. *In this text, relative phrases (such as "more fatalities") should be interpreted as involving comparisons between Paris and the entire country of France (i.e., "proportionally more fatalities in Paris than in France.").* The main findings are also highlighted in color in the respective tables (red corresponds to more crashes; green corresponds to fewer crashes).

Fatalities by person (road user) type (Table 20)

- More pedestrian and motorcycle rider fatalities.
- More moped or scooter rider fatalities.
- Fewer bicycle rider fatalities.
- Fewer passenger vehicle occupant fatalities.

Table 20
Fatalities by person (road user) type, 2010-2011.
(The entries are percentages of all traffic fatalities.)

Road user type	Paris (N = 294)	France (N = 7,955)
Pedestrian	36.1	12.6
Bicycle	1.4	3.6
Motorcycle (>50 cm^3)	35.4	18.4
Moped or scooter (<50 cm^3)	7.8	5.9
Passenger vehicle	16.7	52.5
Other	2.7	6.9

Fatalities by age (Table 21)

- Fewer fatalities for those 18 to 24 years old.

Table 21
Fatalities by age, 2010-2011.
(The entries are percentages of all traffic fatalities.)

Age	Paris (N = 294)	France (N = 7,955)
Under 18	6.1	6.8
18 – 24	16.7	20.7
25 – 64	55.4	53.1
65 or older	21.4	19.1
Unknown	0.3	0.3

Additional traffic fatality measures (Table 22)

- More fatalities involving motorized two-wheelers and/or motorcycles (both about double the rate for France).
- More fatalities involving pedestrians.
- More fatalities involving road users 75 and older.
- Fewer fatalities with young drivers deemed responsible.
- Fewer fatalities with alcohol consumed by drivers or pedestrians.

Table 22
Summaries of select traffic fatality measures, 2007-2011.
(The entries are percentages of all traffic fatalities.)

Measure	Paris (N = 700)	France (N = 21,123)
Fatalities involving motorized two-wheelers (all sizes)	51.6	26.8
Fatalities involving motorcycles (>50 cm^3)	40.7	20.0
Fatalities involving a pedestrian	74.3	62.2
Fatalities in road users 75 and older	14.6	12.0
Fatalities in crashes with young drivers responsible	16.0	22.5
Fatalities in crashes at night	45.1	43.8
Fatalities in crashes with alcohol consumed by driver	20.9	29.9
Fatalities in crashes with alcohol consumed by driver or pedestrian	22.9	31.7

Main findings

Crashes and fatal crashes in London and Paris differ in several aspects from crashes in the entirety of each respective nation. The main differences are summarized below (with "more crashes" meaning proportionally more crashes in each of the two megacities than in the entire respective nation).

London

When

- More crashes and more fatal crashes on weekdays, with correspondingly fewer crashes and fatal crashes on weekends.
- More crashes and more fatal crashes during morning commuting hours.
- Fewer crashes and fewer fatal crashes when commuting to or from work, but more fatal crashes involving a journey for work.
- Fewer crashes commuting to or from school.

Where

- More crashes on single carriageways (undivided highways).
- Fewer crashes and fewer fatal crashes on dual carriageways (divided highways).
- More crashes and more fatal crashes on one-way streets.
- Fewer crashes at roundabouts.
- More crashes and more fatal crashes at marked pedestrian crossings.
- Fewer crashes and fewer fatal crashes with pedestrians in the center of the carriageway or in the carriageway but not crossing.
- Fewer crashes with pedestrians on the footway (sidewalk) or verge.
- More crashes and many more fatal crashes on low-speed roads (30 mph), and fewer crashes and fatal crashes on higher-speed roads (>30 mph). This is likely due to the distribution of speed limits within London versus the rest of the U.K.

Who

- More crashes and more fatal crashes involving cycles (bicycle and motor) and buses.
- More pedestrian and bicyclist crashes with casualties and fatalities.
- More crashes with motorcycle rider or passenger casualties, but not more fatalities. This pattern indicates that these crashes tend to be less severe than in the rest of the U.K.
- Fewer fatalities for drivers, riders or passengers in vehicles.
- More crashes and more fatal crashes involving male drivers (and thus fewer involving female drivers).
- Fewer crashes and fewer fatal crashes involving drivers 16-20 years of age and drivers 66 and older.
- More crashes and more fatal crashes involving drivers 26-45 years of age.
- More crashes involving male casualties, but more fatal crashes with female casualties.
- Fewer crashes involving casualties 0-20 years old, but more fatal crashes involving casualties 0-10 years old. This pattern indicates that crashes involving those 10 and under tend to be more severe than in the rest of the U.K.
- More crashes and more fatal crashes involving casualties 26-45 years of age.
- Fewer crashes involving casualties 56 or older.

Number of vehicles

- Fewer multivehicle crashes and fewer fatal multivehicle crashes.
- More crashes and more fatal crashes not involving another vehicle.

Weather conditions

- Fewer crashes and fewer fatal crashes during rain, snow, fog, or misty weather and on wet, damp, frosty or icy roads.
- More crashes and more fatal crashes during clear weather and on dry roads.

Light conditions

- Fewer crashes and fewer fatal crashes during darkness on unlighted roadways.
- More crashes and more fatal crashes during darkness on lighted roadways. These two patterns are likely due to the distribution of lighted and unlighted roads within London versus the rest of the U.K.

Paris

Who

- More fatal crashes involving motorcycles, mopeds and scooters, and pedestrians.
- Fewer fatal crashes involving bicycles or passenger vehicles.
- Fewer fatalities for those 18-24 years of age and those 75 or older.
- Fewer fatal crashes with young drivers deemed responsible.

Driver actions

- Fewer fatal crashes with alcohol consumed by driver or pedestrian.

Comparison of the European and U.S. megacities

In the lists below, similarities and differences for four megacities are summarized. These lists are based on the findings of the present study for London and Paris, and on the findings of Sivak and Bao (2012) for New York and Los Angeles. (Detailed crash data were not available for Paris; the discussion of crash pattern similarities and differences is based primarily on the data from London, New York, and Los Angeles.)

Demographic aspects

Similarities

- Much higher population density (especially for New York City)
- More people who were born in a foreign nation (especially for London), or who speak a language other than English at home (for the U.S. cities)
- Higher level of education
- Fewer homeowners
- Higher income per capita
- More people under the poverty level
- More time spent travelling to work
- More households with no vehicle
- Fewer people who travel to work using a private vehicle
- More people who use public transportation
- Approximately the same number of persons per household as the national averages

Differences

- The proportion of people living under the poverty level in Paris is approximately the same as the national average for France (it is higher in each of the other three megacities)

Crash patterns

Similarities

- More crashes and fatalities for pedestrians and bicyclists
- More crashes and fatalities involving male drivers
- More crashes not involving another vehicle (i.e., single-vehicle crashes)
- More crashes involving drivers in the 25-45 year old age range (extending up to 55 years old for the U.S. cities)
- Fewer crashes involving alcohol consumption by the driver
- More crashes on low-speed and one-way streets, most likely due to the greater distribution of low-speed and one-way streets within megacities compared with each respective nation as a whole
- Fewer crashes during darkness on unlighted roadways, but more crashes during darkness on lighted roadways, most likely due to the greater distribution of lighted streets within megacities compared with each respective nation as a whole
- Fewer crashes during rain and on wet roads (except for New York City) and fewer crashes during snow and on snowy roads, possibly due to differences in weather patterns for these examined megacities compared with each respective nation as a whole (e.g., London typically experiences a milder climate relative to the rest of the U.K. (i.e., less rain, less snow, warmer temperatures) [Met Office, 2012])

Differences

- More weekend crashes in New York and Los Angeles, but more weekday crashes in London
- More crashes and more fatal crashes at night in New York and Los Angeles, but more crashes and more fatal crashes during morning (commuting hours) in London
- More fatal crashes on divided highways in New York and Los Angeles, but fewer in London
- More crashes and more fatal crashes involving multiple vehicles in New York and Los Angeles, but fewer crashes and fewer fatal crashes of this type in London
- Fewer fatal crashes involving bicycles in Paris, with the opposite finding in the other three megacities

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