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Profiling drink-drivers involved in UK collisions

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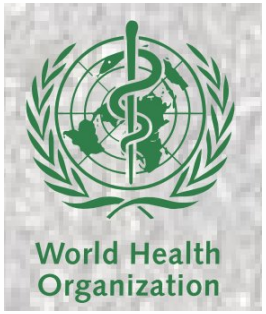
Global Context

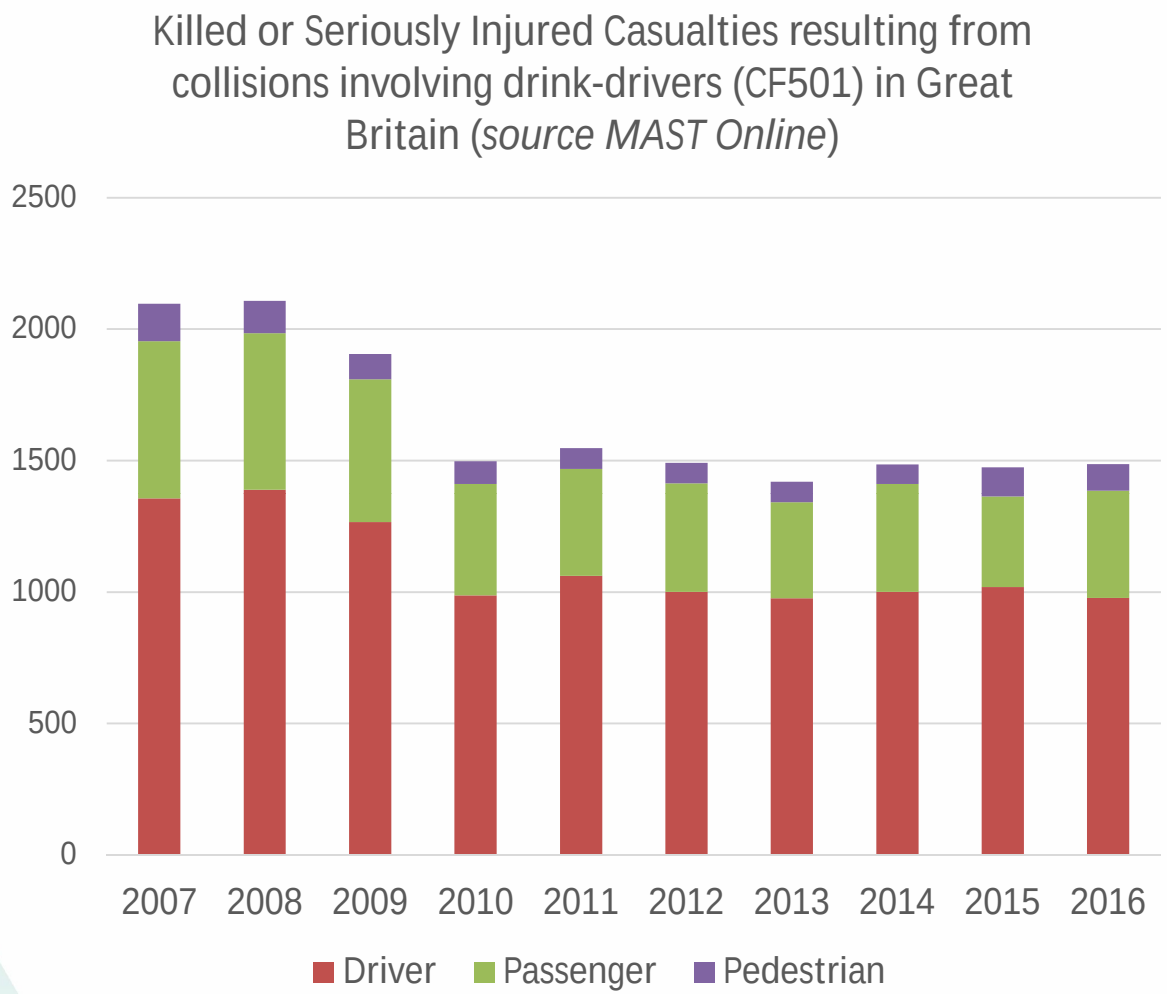
WHO 2015



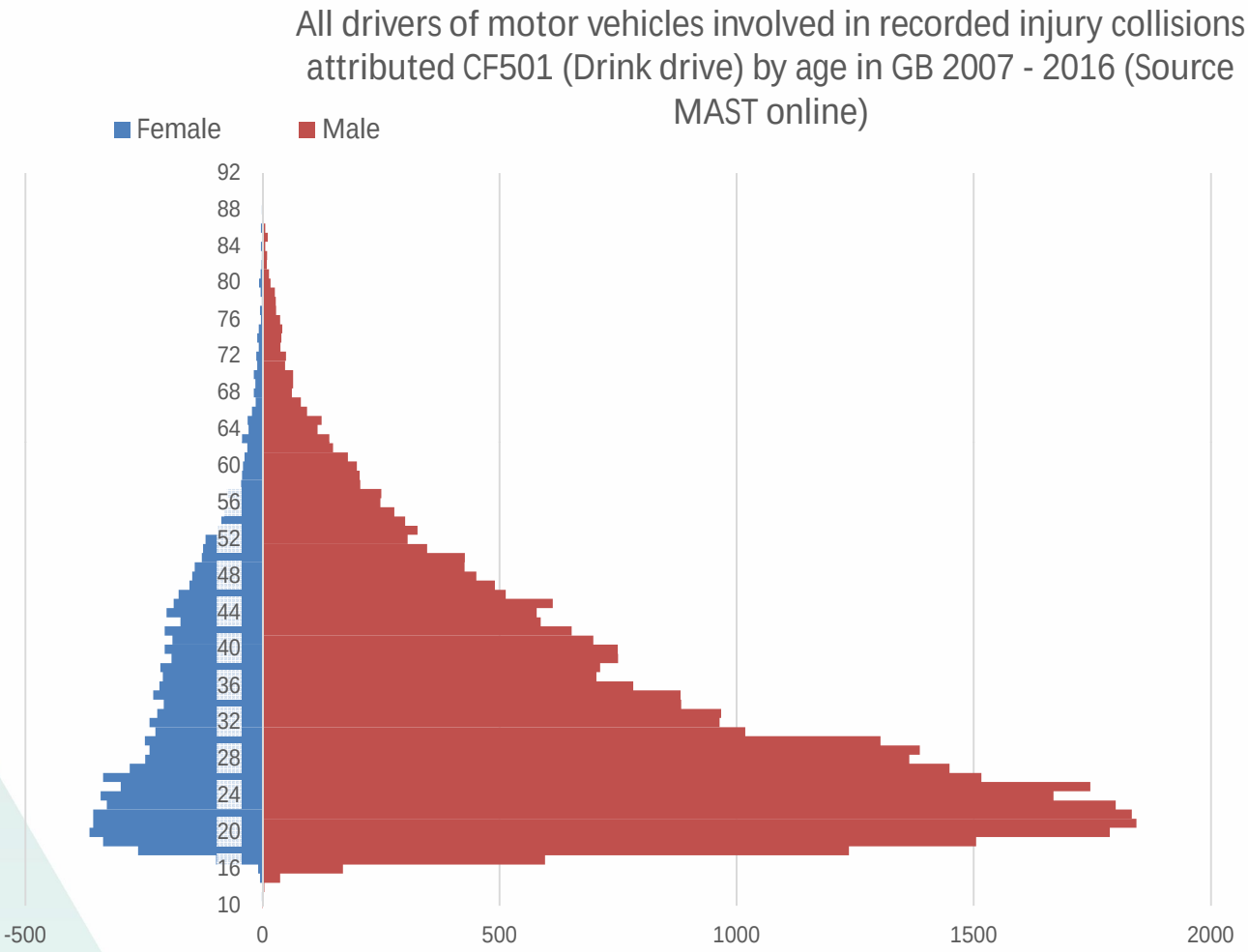
- High-income countries
  - 20% of fatalities have excess alcohol
  - 32,000 killed per year in the WHO European Region
- Low-income countries
  - 33% - 69% of fatally injured drivers have alcohol present

erc

UK Context


Killed or Seriously Injured Casualties resulting from collisions involving drink-drivers (CF501) in Great Britain (*source MAST Online*)
2500
2000
1500
1000
500
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Driver
Passenger
Pedestrian

UK Context

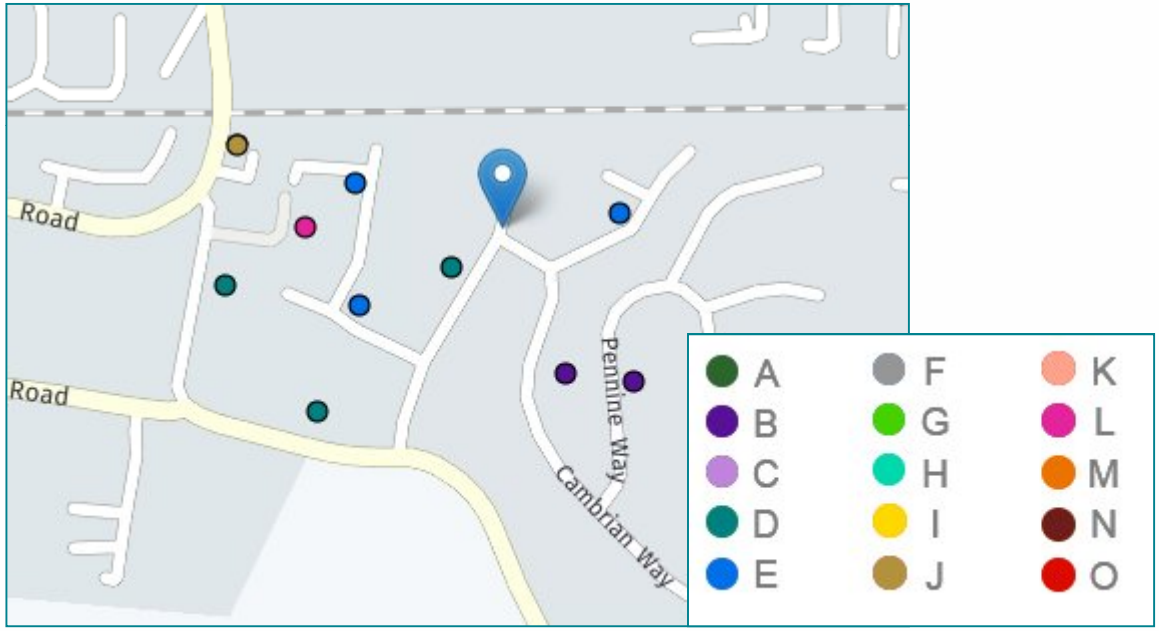

All drivers of motor vehicles involved in recorded injury collisions attributed CF501 (Drink drive) by age in GB 2007 - 2016 (Source MAST online)
Female
Male
92
88
84
80
76
72
68
64
60
56
52
48
44
40
36
32
28
24
20
16
10
-500
0
500
1000
1500
2000

Methodology

- Reported injury collisions between 2011 and 2015 in the UK, where a police officer attended
- 612,221 collisions for which a contributory factor (CF) was assigned (e.g. impaired by drugs, impaired by alcohol, exceeding speed limit, driver using mobile phone, distraction in vehicle, distraction outside vehicle etc.)
- 24,577 had ‘impaired by alcohol’ as a CF (4.01%). Therefore, approximately one in 25 injury collisions with CFs assigned include drivers driving while impaired by alcohol.

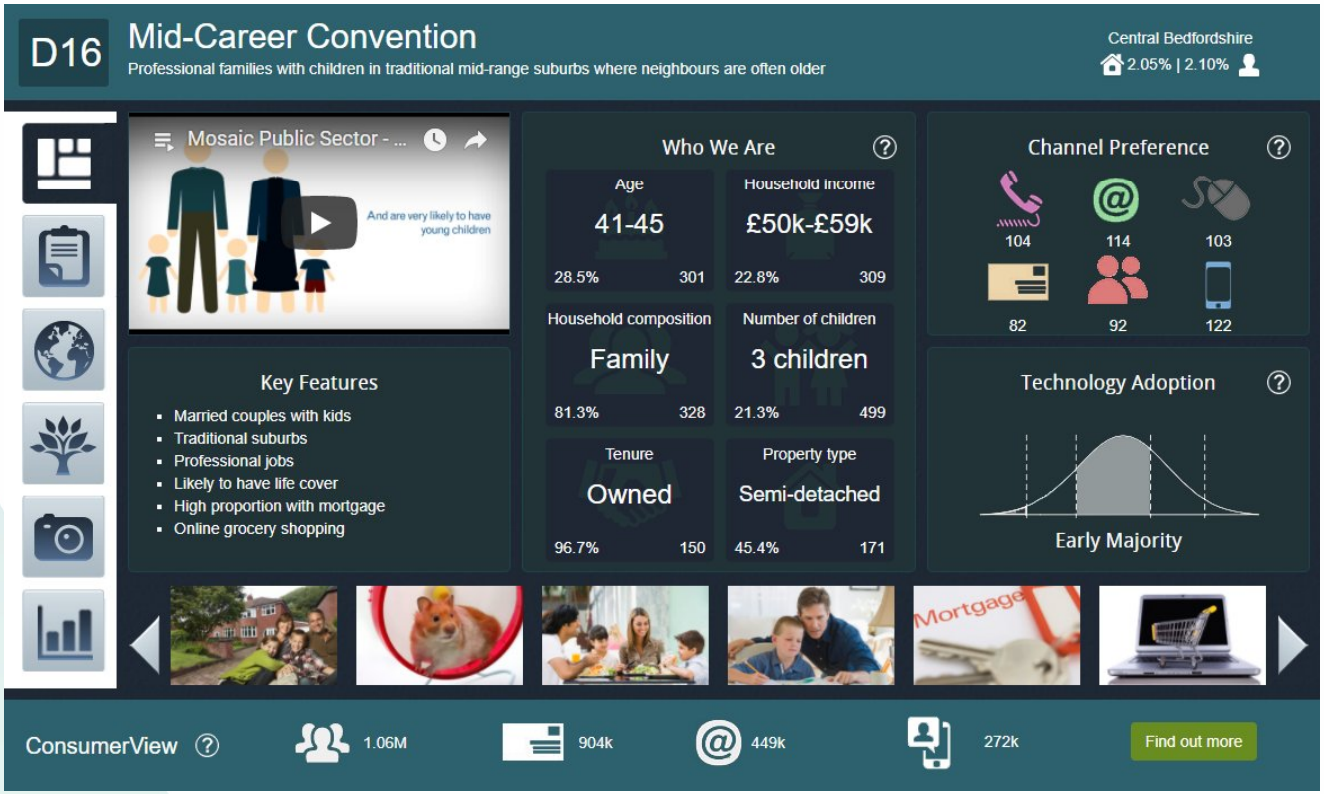
Methodology

- All drivers with a reported postcode are matched to an Experian Mosaic Group and Type



Methodology

- Mosaic groups the population according to socio-demographics using thousands of data sources



Methodology

- Hypothesis: The probability to drive while impaired by alcohol and contribute to crashes varies according to Mosaic Types
- Tested using a multilevel mixed-effects logistic regression, utilizing the hierarchical nature of the data (drivers within Mosaic Types)
- Three categories of independent variables are used, namely: i) road category, ii) crash condition variables and iii) vehicle and driver related variables.

Methodology

- To evaluate drivers with the 'impaired by alcohol' factor assigned in collisions, firstly a descriptive analysis by Mosaic Type is provided, and secondly a multilevel mixed-effects logistic regression is conducted, according to the following logit random intercept model specification (Steele, 2009):

$$\log\left(\frac{\pi_{ij}}{1-\pi_{ij}}\right) = \beta_0 + \beta_1 X_{ij} + u_j$$

Where, β_0 is the overall intercept, β_1 is the cluster specific effect, X_{ij} is the vector with explanatory variables, and u_j is the group (random) effect.

Results

- Uneven distribution of collisions by Mosaic

Table 1. Drivers with 'impaired by alcohol' factor assigned in collisions, by Mosaic Type (N = 612,221)

Mosaic Group	Mosaic Type	CF* (%)
Country Living	Rural Vogue	5.08
	Scattered Homesteads	4.73
	Wealthy Landowners	4.94
	Village Retirement	4.21
Domestic Success	Cafés and Catchments	2.26
	Modern Parents	3.06
	Mid-Career Convention	3.26
	Thriving Independence	3.72
Rural Reality	Far-Flung Outposts	4.49
	Outlying Seniors	4.97
	Local Focus	6.23
	Satellite Settlers	4.69
Rental Hubs	Career Builders	4.24
	Central Pulse	3.42
	Learners & Earners	3.98
	Student Scene	4.45
	Flexible Workforce	2.41
	Bus-Route Renters	5.73
Family Basics	Budget Generations	4.87
	Childcare Squeeze	5.01
	Families with Needs	5.70
	Solid Economy	4.33
	Not classified	*4.07*
Prestige Positions	Empty-Nest Adventure	3.20
	Bank of Mum and Dad	3.32
	Alpha Families	3.46
	Premium Fortunes	3.24
	Diamond Days	2.49
Suburban Stability	Dependable Me	3.82
	Fledgling Free	4.02
	Boomerang Boarders	3.45
	Family Ties	3.60
Aspiring Homemakers	Affordable Fringe	3.95
	First-Rung Futures	4.19
	Flying Solo	4.91
	New Foundations	3.00
	Contemporary Starts	4.32
	Primary Ambitions	3.76
Modest Traditions	Self-Supporters	5.16
	Offspring Overspill	3.84
	Down-to-Earth Owners	4.81
Vintage Value	Seasoned Survivors	5.38
	Aided Elderly	3.24
	Pocket Pensions	4.61
	Dependent Greys	5.25
	Estate Veterans	4.98
City Prosperity	World-Class Wealth	1.50
	Penthouse Chic	1.43
	Metro High-Flyers	1.96
	Uptown Elite	1.71
Senior Security	Legacy Elders	2.81
	Solo Retirees	3.52
	Bungalow Haven	2.98
	Classic Grandparents	3.35
Urban Cohesion	Cultural Comfort	1.96
	Community Elders	2.22
	Asian Heritage	2.88
	Ageing Access	3.07
Transient Renters	Disconnected Youth	5.76
	Renting a Room	6.04
	Make Do & Move On	5.86
	Midlife Stopgap	4.99
Municipal Challenge	Low Income Workers	5.66
	Streetwise Singles	6.52
	High Rise Residents	4.93
	Crowded Kaleidoscope	1.63
	Inner City Stalwarts	2.27

Note: * CF - contributory factor: 'impaired by alcohol' factor assigned in collisions.

Results

- Uneven distribution across road categories, traffic conditions, vehicle types and driver characteristics

Name		CF: 'impaired by alcohol' factor assigned in collisions (%)
ALL collisions	--	4.01
Road class	Motorway	2.80
	Upgraded main road	3.69
	Main road	3.21
	Secondary road	4.73
	Tertiary road	4.86
	Unclassified road	5.15
Road type	Roundabout	3.22
	Dual carriageway	3.05
	Single carriageway	4.32
	Other road type	3.48
Crash location	Urban	3.64
	Rural	4.59
	Unknown	9.09
Crash time	3:00 – 4:00 a.m.	32.88
Road surface condition	Dry	3.95
	Wet/ Damp	4.26
	Snow	2.52
	Frost/ Ice	3.24
	Flood	1.71
	Unknown	5.69

Results

- Multilevel logistic regressions of the propensity to drive while impaired by alcohol and contribute to crashes
- A three-stage additive model is used
- Model 1 in reveals that alcohol-related crashes are more common for drivers using certain categories of roads.

Motorways
Urban areas

Single-carriageways
Rural roads

Results

- Model 2 adds time of day, road surface conditions and light.

Poor weather
Daylight

Darkness
Dry roads

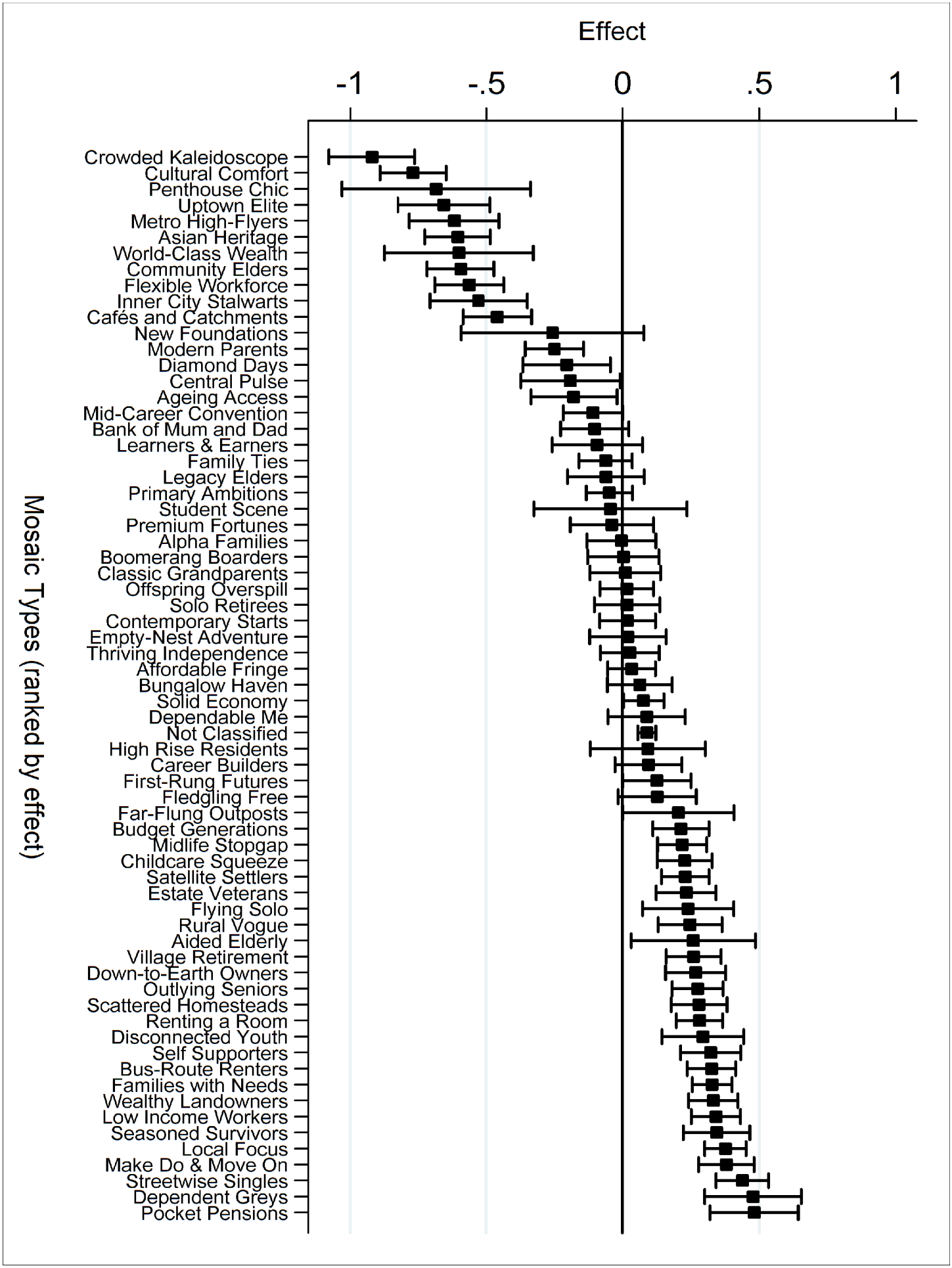
- Model 3 adds vehicle types, age and gender

Goods and commercial vehicles
Female

Private cars
Males & ages 26-45

Results

- Mosaic types ranked by effect after controlling for road category variables, crash condition variables and vehicle and driver related
- If a Mosaic Type whose confidence interval does not overlap the line at zero it is considered to differ significantly from the UK average (at the 95% confidence interval)


Effect
-1
-.5
0
.5
1
Mosaic Types (ranked by effect)
Crowded Kaleidoscope
Cultural Comfort
Penthouse Chic
Uptown Elite
Metro High-Flyers
Asian Heritage
World-Class Wealth
Community Elders
Flexible Workforce
Inner City Stalwarts
Cafés and Catchments
New Foundations
Modern Parents
Diamond Days
Central Pulse
Ageing Access
Mid-Career Convention
Bank of Mum and Dad
Learners & Earners
Family Ties
Legacy Elders
Primary Ambitions
Student Scene
Premium Fortunes
Alpha Families
Boomerang Boarders
Classic Grandparents
Offspring Overspill
Solo Retirees
Contemporary Starts
Empty-Nest Adventure
Thriving Independence
Affordable Fringe
Bungalow Haven
Solid Economy
Dependable Me
Not Classified
High Rise Residents
Career Builders
First-Rung Futures
Fledgling Free
Far-Flung Outposts
Budget Generations
Midlife Stopgap
Childcare Squeeze
Satellite Settlers
Estate Veterans
Flying Solo
Rural Vogue
Aided Elderly
Village Retirement
Down-to-Earth Owners
Outlying Seniors
Scattered Homesteads
Renting a Room
Disconnected Youth
Self Supporters
Bus-Route Renters
Families with Needs
Wealthy Landowners
Low Income Workers
Seasoned Survivors
Local Focus
Make Do & Move On
Streetwise Singles
Dependent Greys
Pocket Pensions

Most Likely to Offend

O63 Streetwise Singles

Hard-pressed singles in low cost social flats searching for opportunities

G28 Local Focus

Rural families in affordable village homes who are reliant on the local economy for jobs

Least Likely to Offend

O65 Crowded Kaleidoscope

Multi-cultural households with children renting social flats in over-crowded conditions

C12 Metro High-Flyers

Ambitious people in their 20s and 30s renting expensive apartments in highly commutable areas of major cities

Limitations

- Imperfect matching of age with the composition of the communities
  - Matching postcode, not household
  - Population movements

- Drink-drive contributory factors were assigned by police officers. Therefore, contributory factors reflect the reporting officer's opinion at the time of reporting and may not be the result of extensive investigation

Next steps

- Inform national campaigns

- Target enforcement