CEDAR Centre for Diet and Activity Research
A UKCRC Public Health Research Centre of Excellence

Area-level harmonisation

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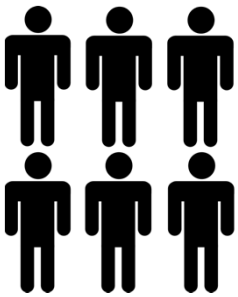
Individual level studies



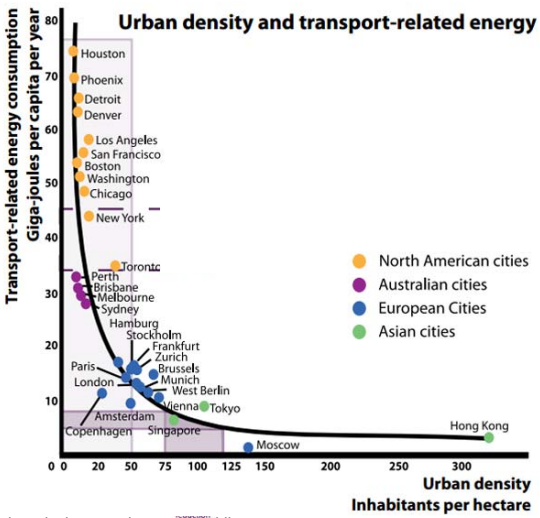
- Individual level: socio-economics, demographic, attitude, behaviour
- Outcome variable: walking time, use of active travel modes, leisure time physical activity, accelerometer-based data
- Determinants: age, sex, car ownership, occupation, attitudes, neighbourhood perception

Area level studies

https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1197&context=jj_pubs

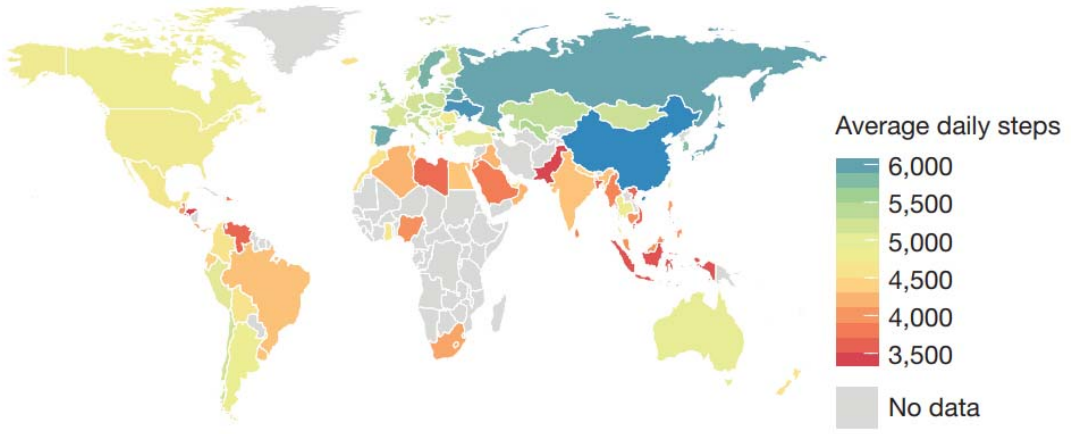
- Size of areal unit: Neighbourhoods, wards, cities, regions, or countries
- Outcome variable: Prevalence of physical inactivity, proportion of adults engaging in active travel
- Determinants: City structure, land-use mix, walkability, cycle infrastructure network, sprawl, density,

Density and transport energy consumption



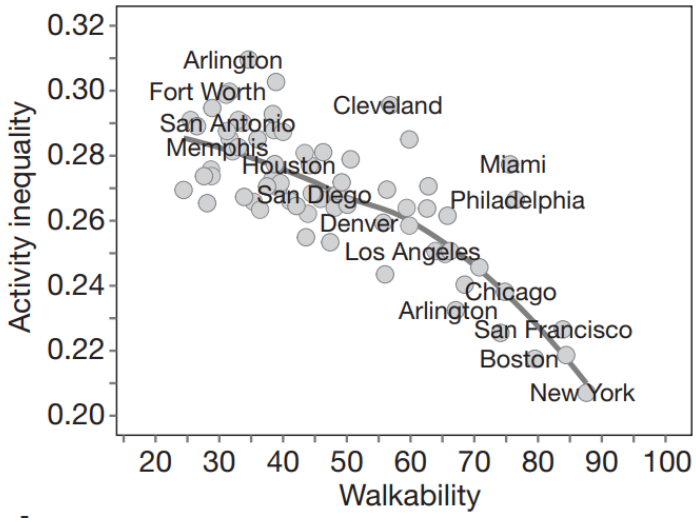
Newman, P. and Kenworthy, J., 2006. Urban design to reduce automobile dependence. *Opolis*, *2*(1).

Walking activity across the world



Althoff, T., Hicks, J. L., King, A. C., Delp, S. L., & Leskovec, J. (2017). Large-scale physical activity data reveal worldwide activity inequality. *Nature*, *547*(7663), 336.

Gender inequality in walking levels in US cities



Althoff, T., Hicks, J. L., King, A. C., Delp, S. L., & Leskovec, J. (2017). Large-scale physical activity data reveal worldwide activity inequality. *Nature*, *547*(7663), 336.

Association of Available Parkland, Physical Activity, and Overweight in America's Largest Cities

Stephanie T. West, PhD; Kindal A. Shores, PhD; Lanay M. Mudd, PhD

The link between obesity and the built environment. Evidence from an ecological analysis of obesity and vehicle miles of travel in California

Javier Lopez-Zetina[a,*], Howard Lee[b], Robert Friis[a]

Commuting in Transit Versus Automobile Neighborhoods

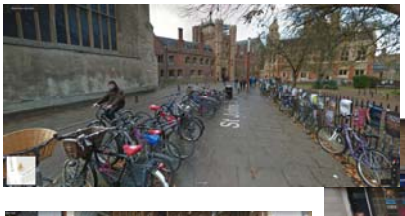
Robert Cervero & Roger Gorham

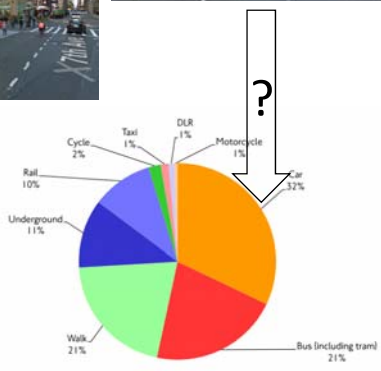
Google Street View: A case study

Google Street View: a case study

Objectives

To test the predictability of active travel and motor vehicle use at city level using Google Street View (GSV)





Google Street View API

- The process of selecting a location on map, accessing the street view and deciding the direction of view is automated through an API
- The images can be accessed using a command line:

```
https://maps.googleapis.com/maps/api/streetview?size=600x400&location=46.414382,10.013988&heading=151.78&pitch=-0.76&key=YOUR_API_KEY
```

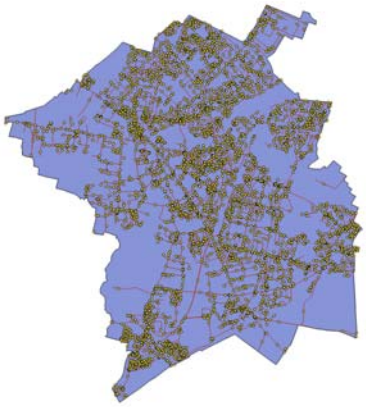
640x640

Case Study

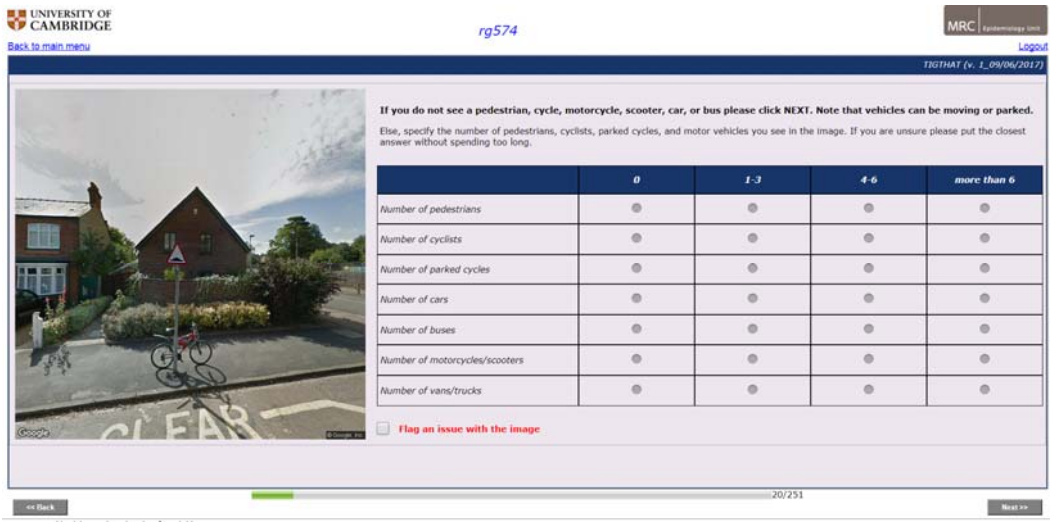
- We used Primary Urban Areas (PUA) as the units of analysis
- PUAs are formed by combining contiguous local authorities
- A total of 34 cities: 25 randomly sampled and rest included to account for Biobank centres

Sampling of images

- Two stage sampling
  - Random location on all road links in the network
  - Selection of 1000 random points in each city
- For each location two images were accessed in two opposite directions: headings of 0 and 180 degrees
- 2000 images per city



Webpage for GSV questionnaire



GSV outputs

Expressed as number of images with different road users (total 2000 images per city)

PUA	Cycles	Parked Cycles	Pedestrians	Cars	Buses	Motorcycles
Cambridge	94	132	281	1412	44	19
Oxford	76	127	347	1488	74	17
Brighton	44	87	371	1604	54	42
York	34	12	169	1367	29	12
Hull	32	14	239	1488	18	10
Ipswich	28	9	234	1476	22	22
Norwich	21	5	172	1259	17	15
Edinburgh	20	15	244	1430	54	15
Slough	19	3	192	1620	17	7
Blackpool	17	10	276	1563	19	14

Comparison datasets

Census

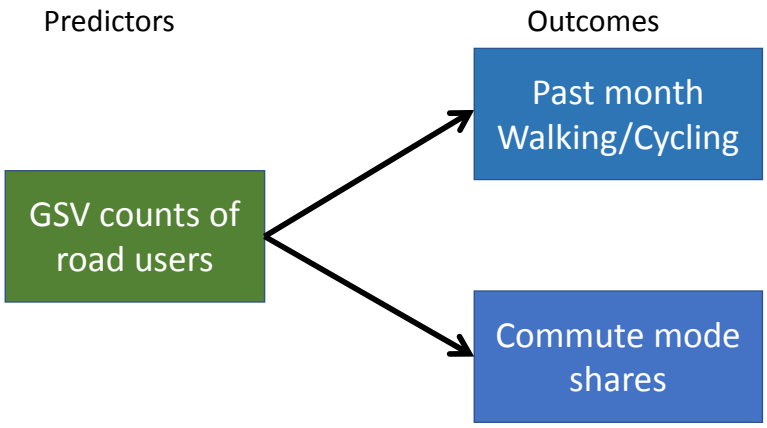
- ✓Last conducted in 2011
- ✓Usual mode of travel to work
- ✓Covers all population

Active People Survey

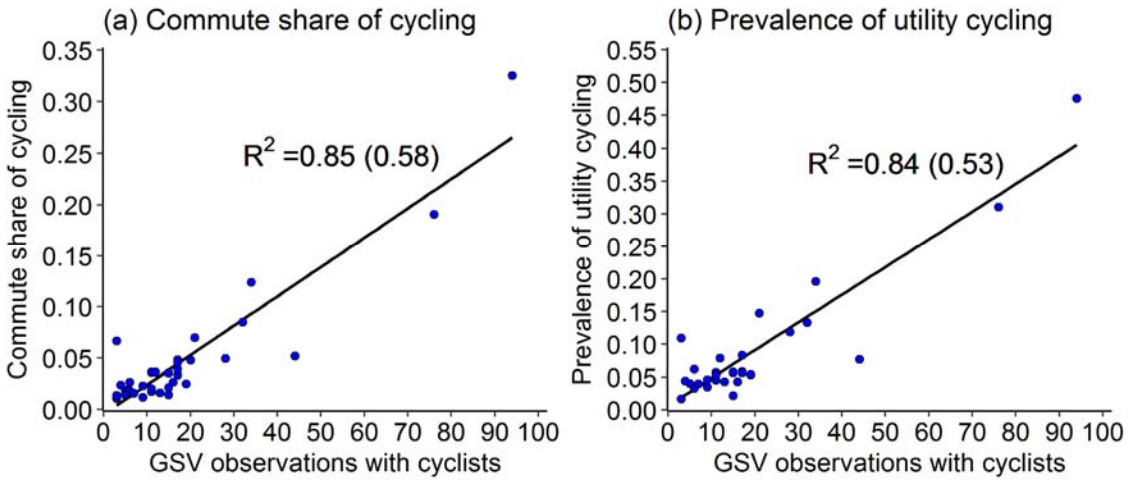
- ✓ Conducted annually
- ✓ CATI surveys for a small sample of adults
- ✓ Self-reported walking and cycling (past-month)

Used 2011 as the common year to both datasets

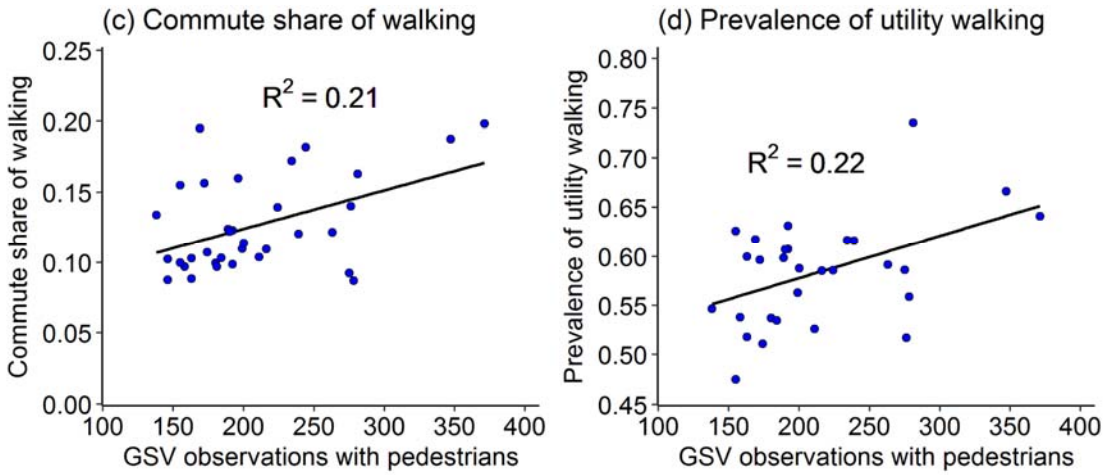
Correlation/Regression analysis



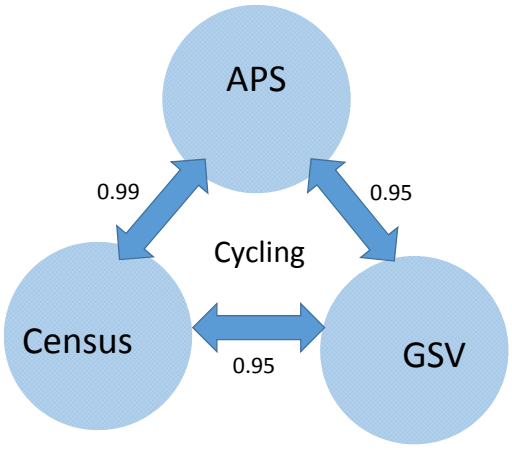
Correlations



Correlations



How do different datasets compare? (Pearson correlation)



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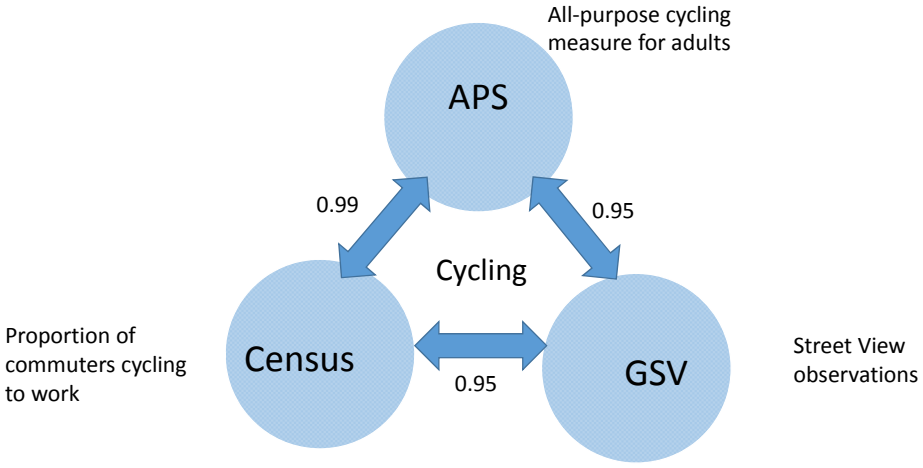
How do different datasets compare? (Pearson correlation)



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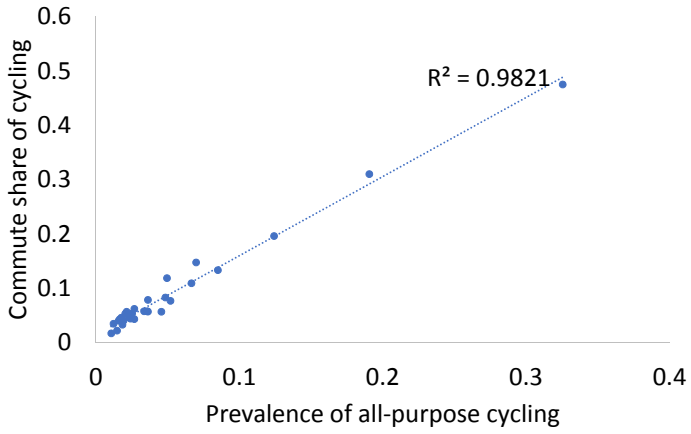
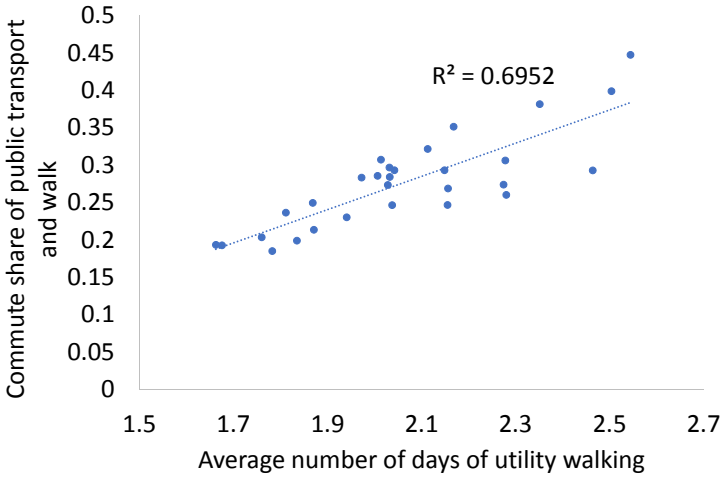
Census and Active People Survey (Cycling)



Y-axis: How do you usually travel to work?
Those who answered Cycle

X-axis: On how many days in the last 4 weeks have you done any cycling?
Those who answered with 1 day or more

Census and Active People Survey (Walking)



Y-axis: How do you usually travel to work?
Those who answered any public transport mode or walking

X-axis: On how many days in the last 4 weeks have you done any walking?
(minus)
On how many of those days did you walk for the

PLOS ONE

RESEARCH ARTICLE

Estimating city-level travel patterns using street imagery: A case study of using Google Street View in Britain

Rahul Goel[1]*, Leandro M. T. Garcia[1], Anna Goodman[2], Rob Johnson[1], Rachel Aldred[3], Manoradhan Murugesan[4], Soren Brage[5], Kavi Bhalla[4], James Woodcock[1]

1 UKCRC Centre for Diet and Activity Research (CEDAR), MRC Epidemiology Unit, University of Cambridge School of Clinical Medicine, Cambridge, United Kingdom, 2 London School of Hygiene & Tropical Medicine, London, United Kingdom, 3 Department of Planning and Transport, Faculty of Architecture and the Built Environment, Westminster University, London, United Kingdom, 4 Department of Public Health Sciences, University of Chicago, Chicago, United States of America, 5 MRC Epidemiology Unit, University of Cambridge, Cambridge, United Kingdom

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Check for updates

Conclusions

- Area level harmonisation needs a different outlook than individual level harmonisation
- Make better use of reported aggregate numbers at the area level
- Growing use of smartphone-based data may be less informative at the individual level
- Methods need to be refined