University of Reading

What do people do at peak demand?

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Social practices and peak energy demand

The timing, location and synchronisation of social practices together constitute peak energy demand.

Taking 7am-10am as the morning peak, and 4pm-10pm as the evening peak, this work aims to:

- develop methods of capturing both when and where peak energy demand takes place (i.e. in the home, at work and on the move)
- investigate how socio-demographic variables (e.g. gender, households with and without children) affect the temporal and spatial construction of peak demand
- Investigate who people spend time with as a way of moving beyond the individual occupant approach

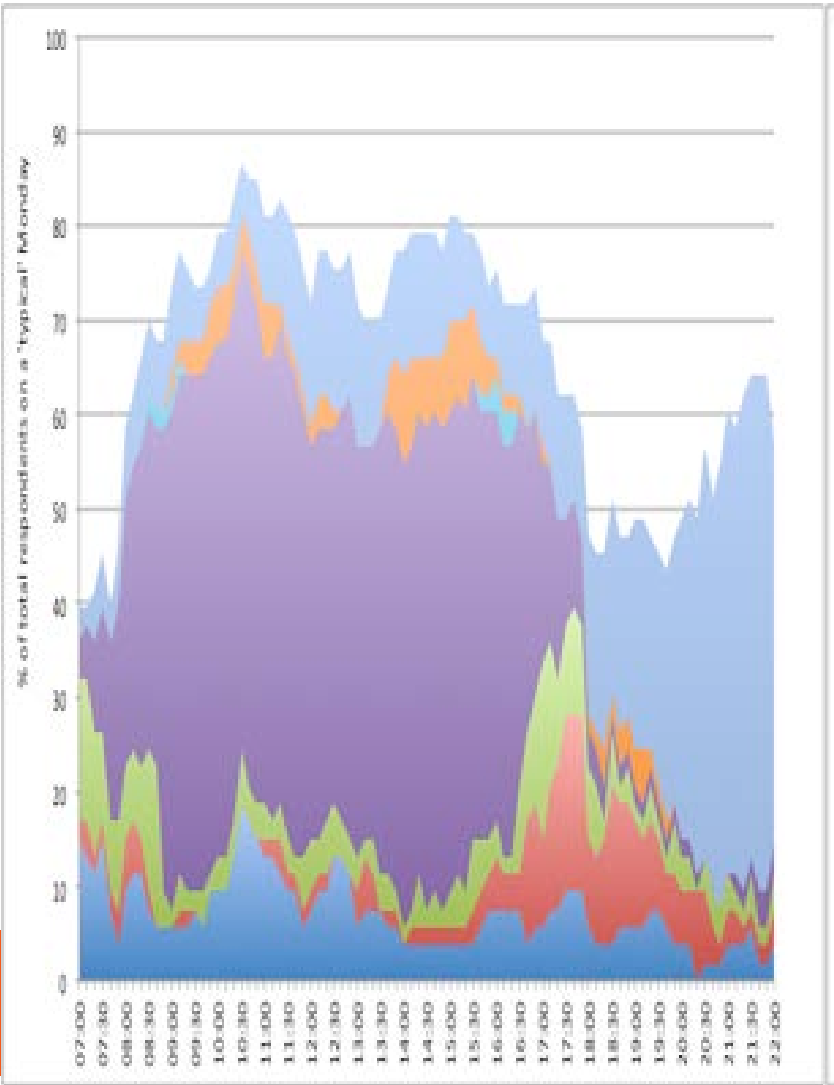
Trajectory time use dataset

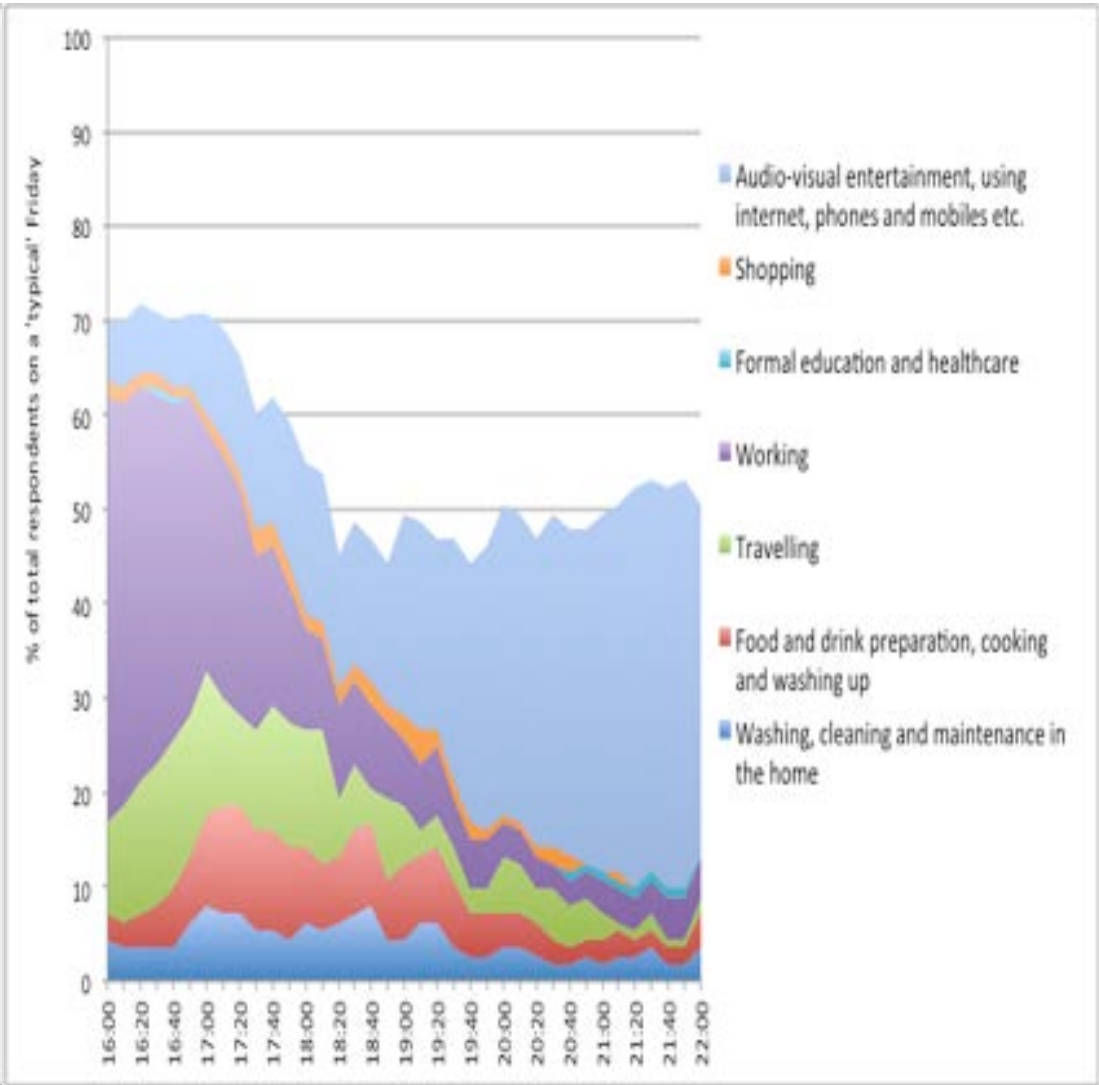
- 500 respondents
- with GPS devices for 3 days
- collecting 10 minute interval data (May-November 2011)
- + diary and questionnaire information on what people were doing at any given time of the day
- Although the sample is smaller than publicly available time use surveys (e.g. NTUS 2000-2001 and 2005), and is an urban sample of residents in five UK cities, the Trajectory dataset allows temporal analysis to be combined with spatial analysis of the data

Monday and Friday morning and evening peaks – higher energy consuming activities

Monday

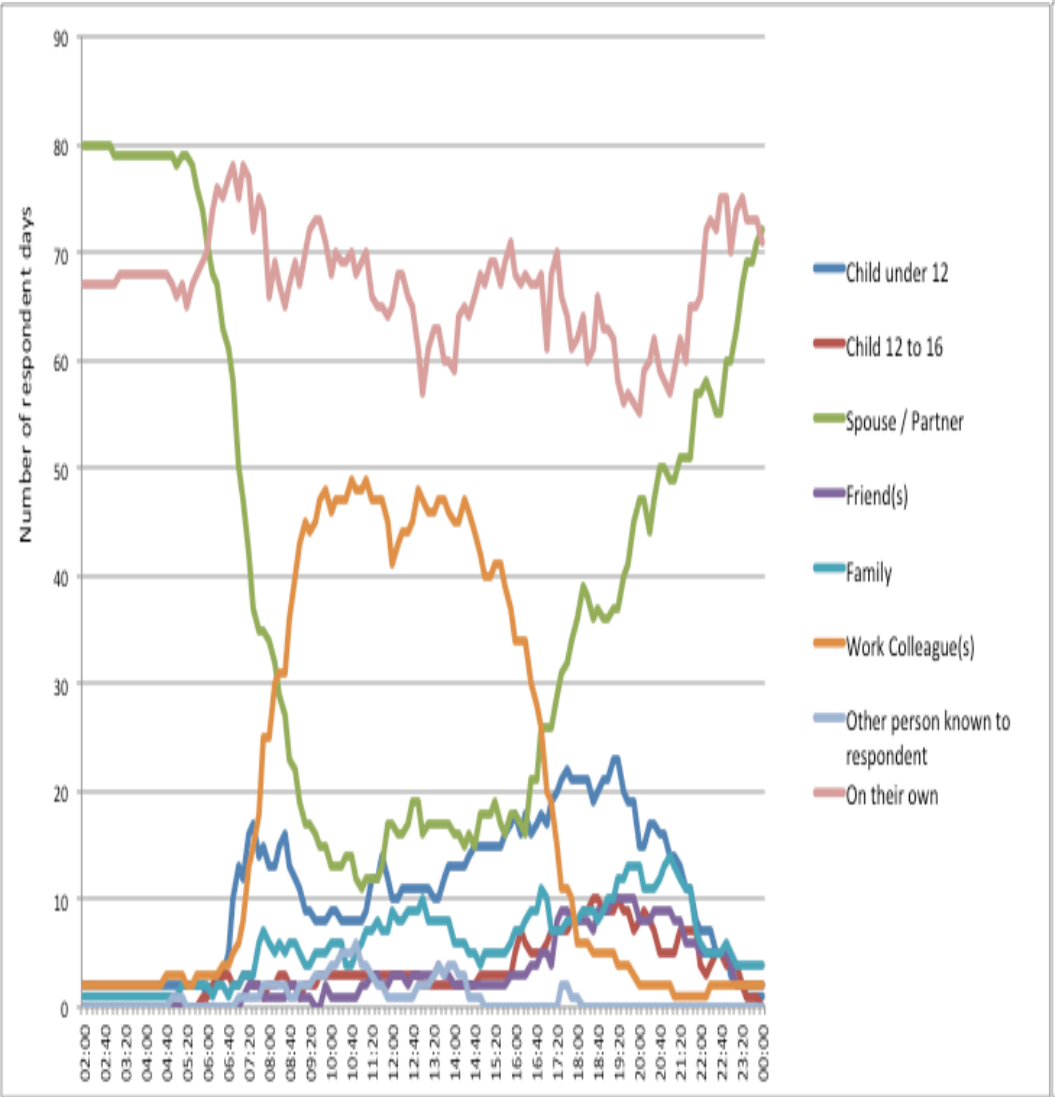
Friday



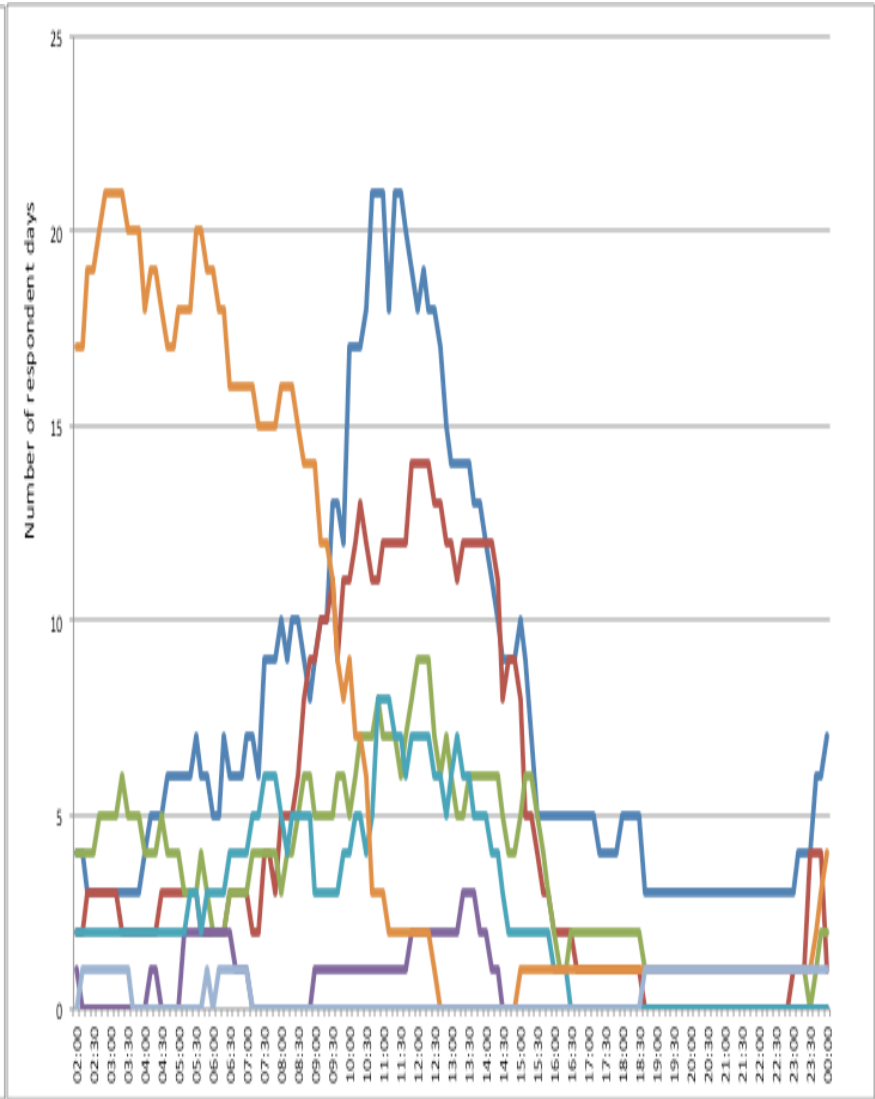


Who respondents were with: weekdays

1st person

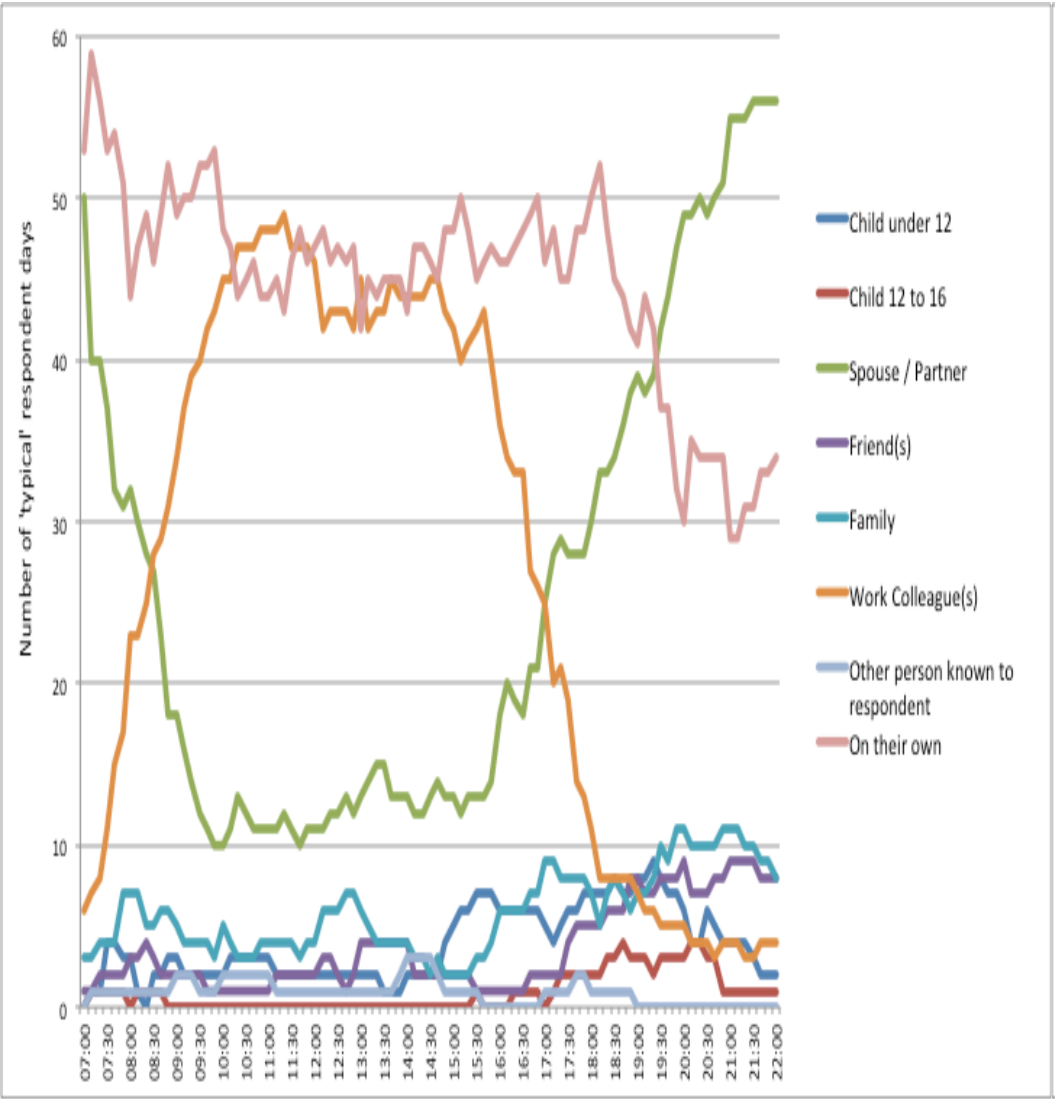


2nd Person

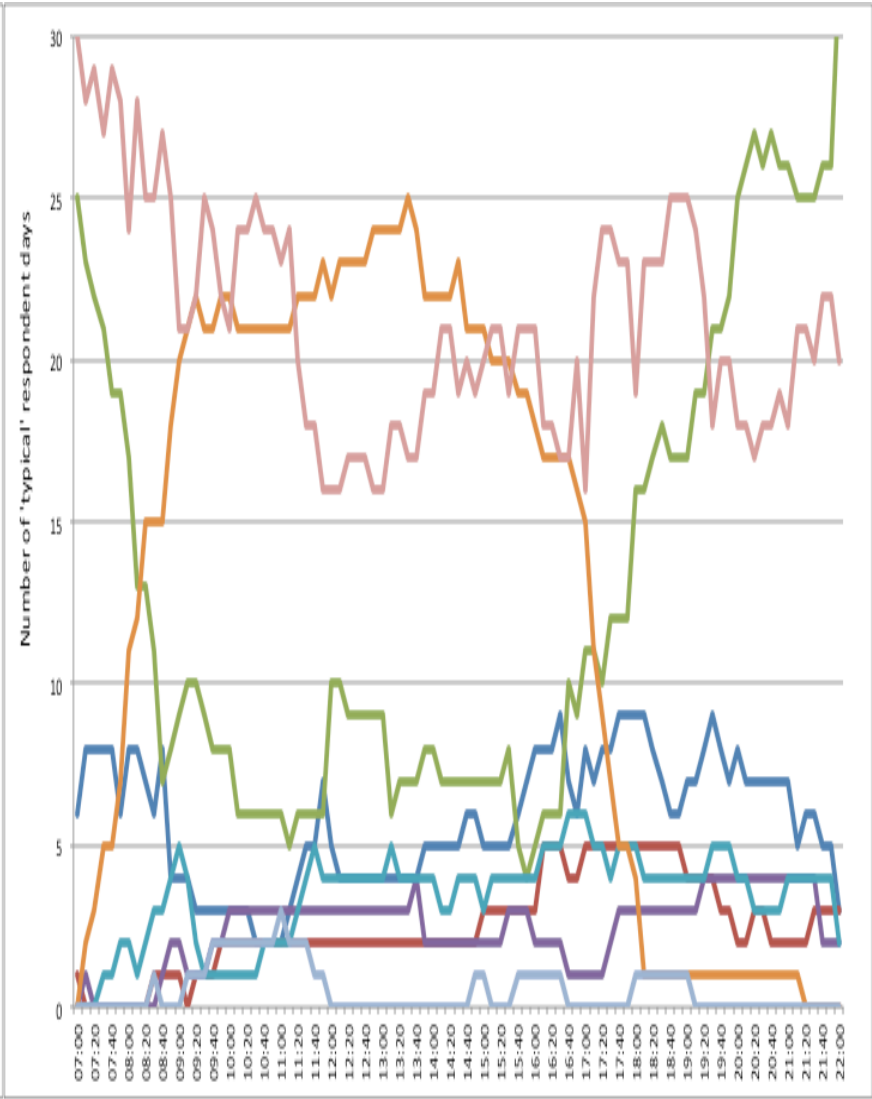


First person respondents were with by gender

Men

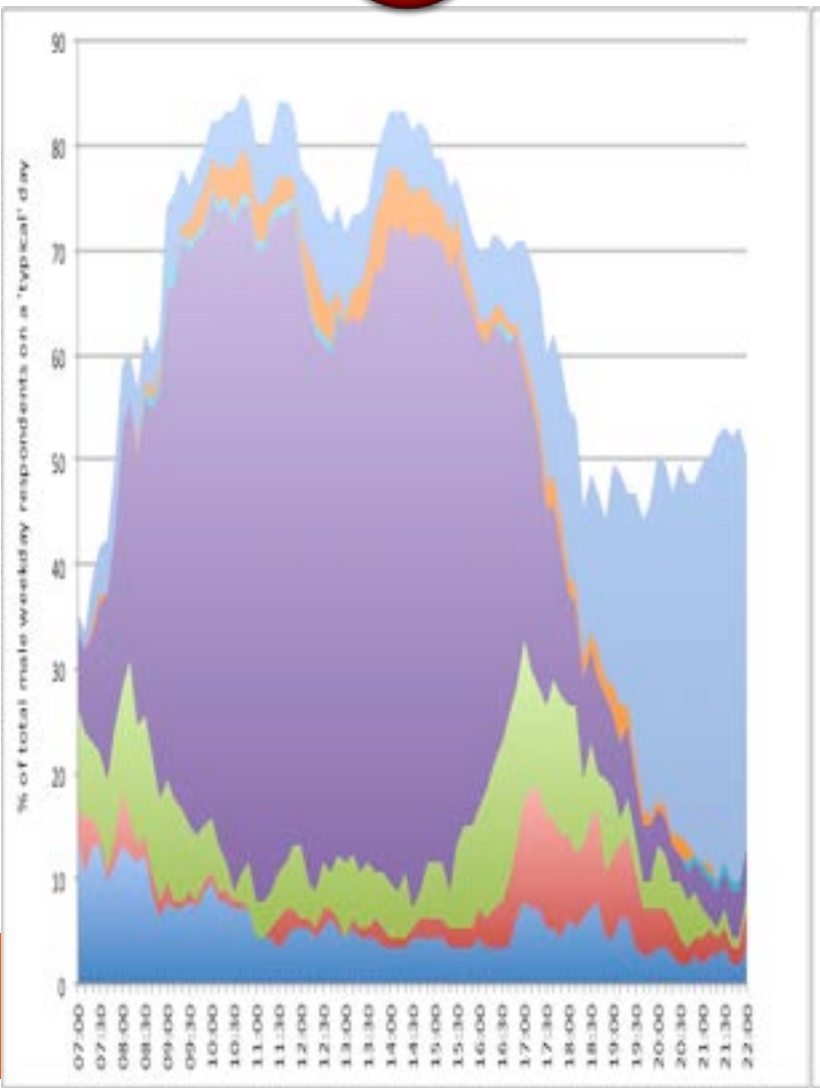


Women

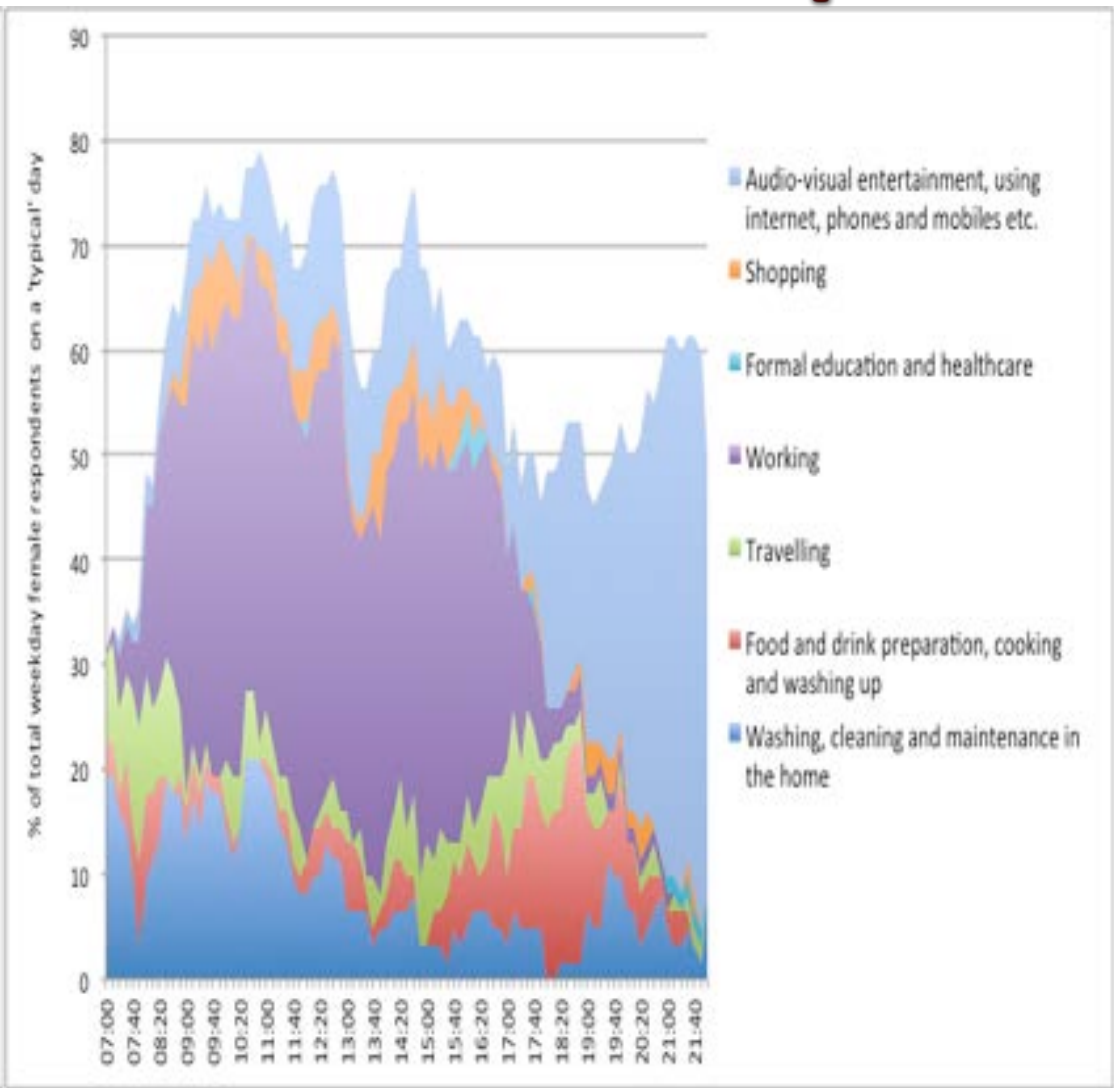


Gender: weekdays

Men



Women



Erraticness index and activities over time by gender

- **Erraticness index** = average number of activities performed over a given time period, from a total of 38 activity codes

Average number of activities by gender

Demographic group	2am - 2am	Morning peak: 7am - 10am	Evening peak: 4pm - 10pm	Average % of time, 2am – 2am: working	Average % of time, 4pm – 10pm: food preparation, cooking & washing up
All males	8.1	3.6	4.8	23.1%	5.6%
All females	9.6	4.0	5.3	14.5%	8.1%
Males who worked	8.4	3.9	5.2	31.9%	4.2%
Females who worked	9.4	4.3	5.8	29.1%	10.3%

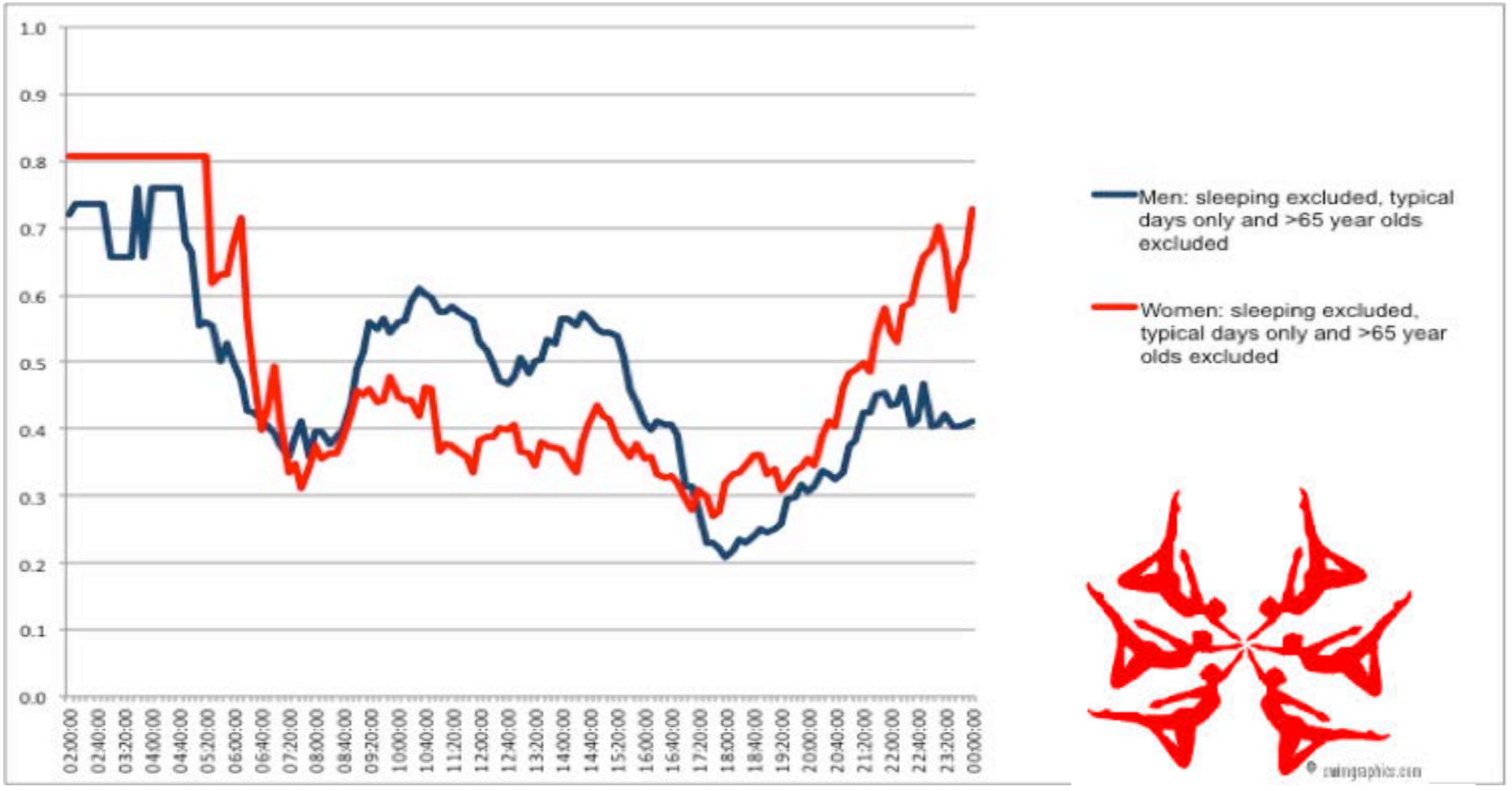
N.B. Respondents of working age / typical days only

Synchronisation of social practices

- Occurs when practices are to some extent happening together over the same time periods, across multiple spaces.
- Synchronisation matters because it generates peaks in energy demand and implies potential to manage social practices.

Synchronisation high	***Synchronisation low***	
Many people doing the same energy-intensive activity at the same time	**Many people doing different energy-intensive activities at the same time**	***Energy demand higher***
Many people doing the same lower energy activity at the same time	Many people doing different lower energy activities at the same time	***Energy demand lower***

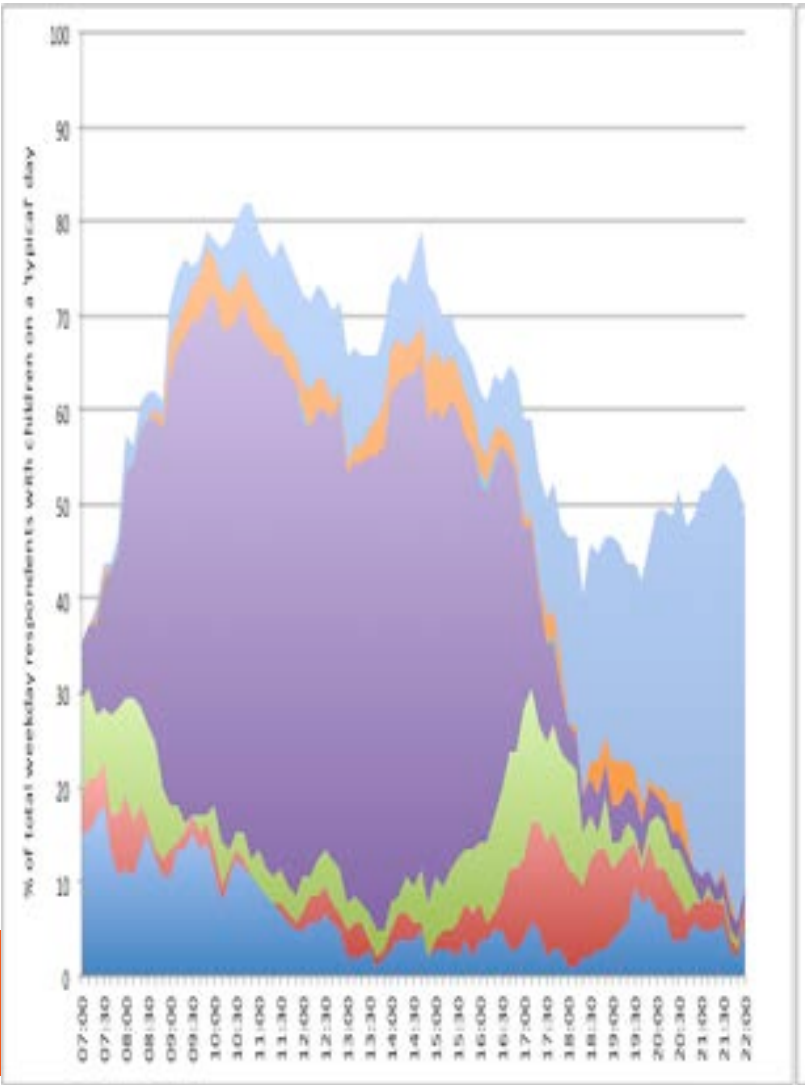
Synchronisation index: relative synchronisation of men and women

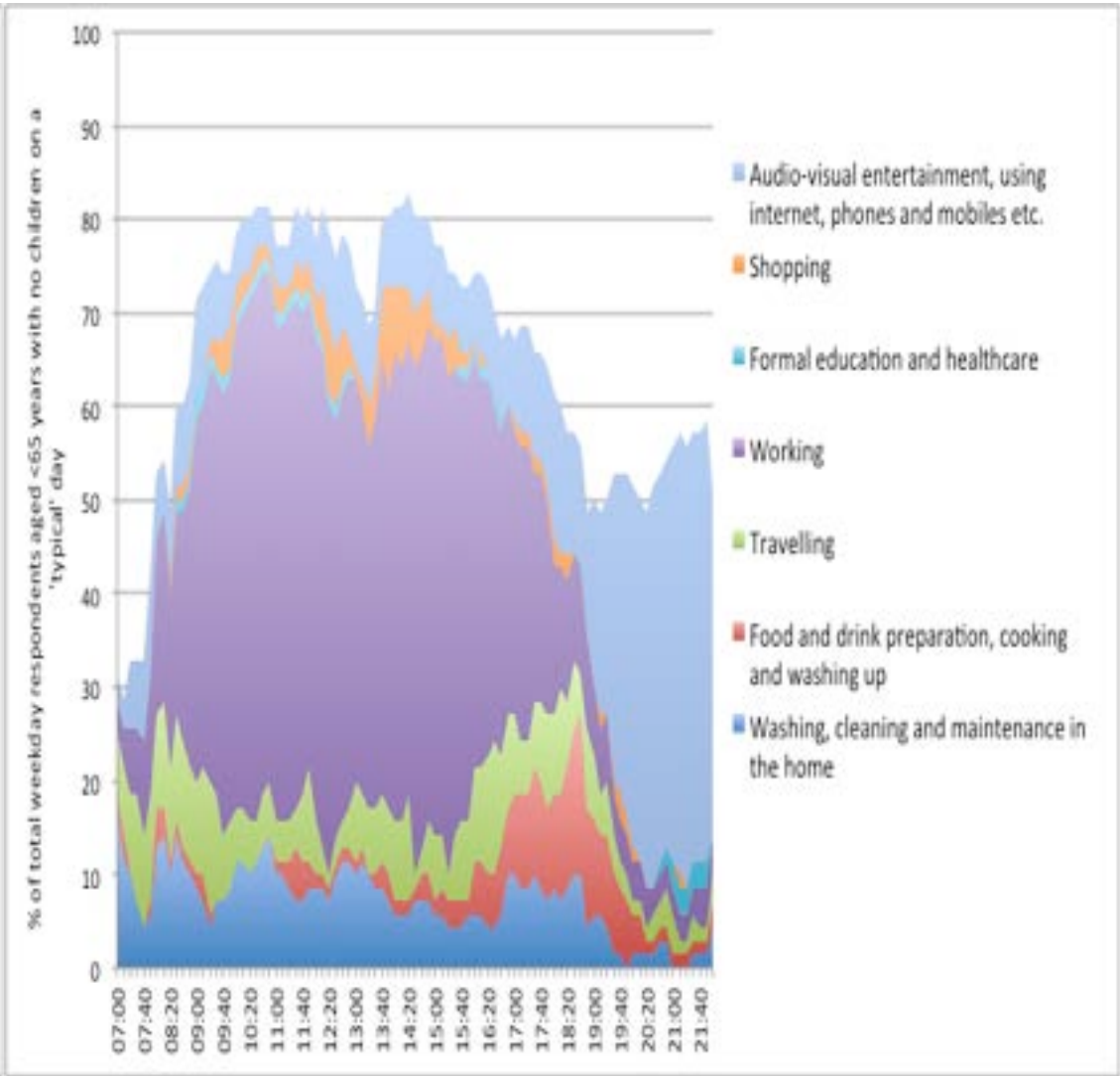


With or without children: weekdays

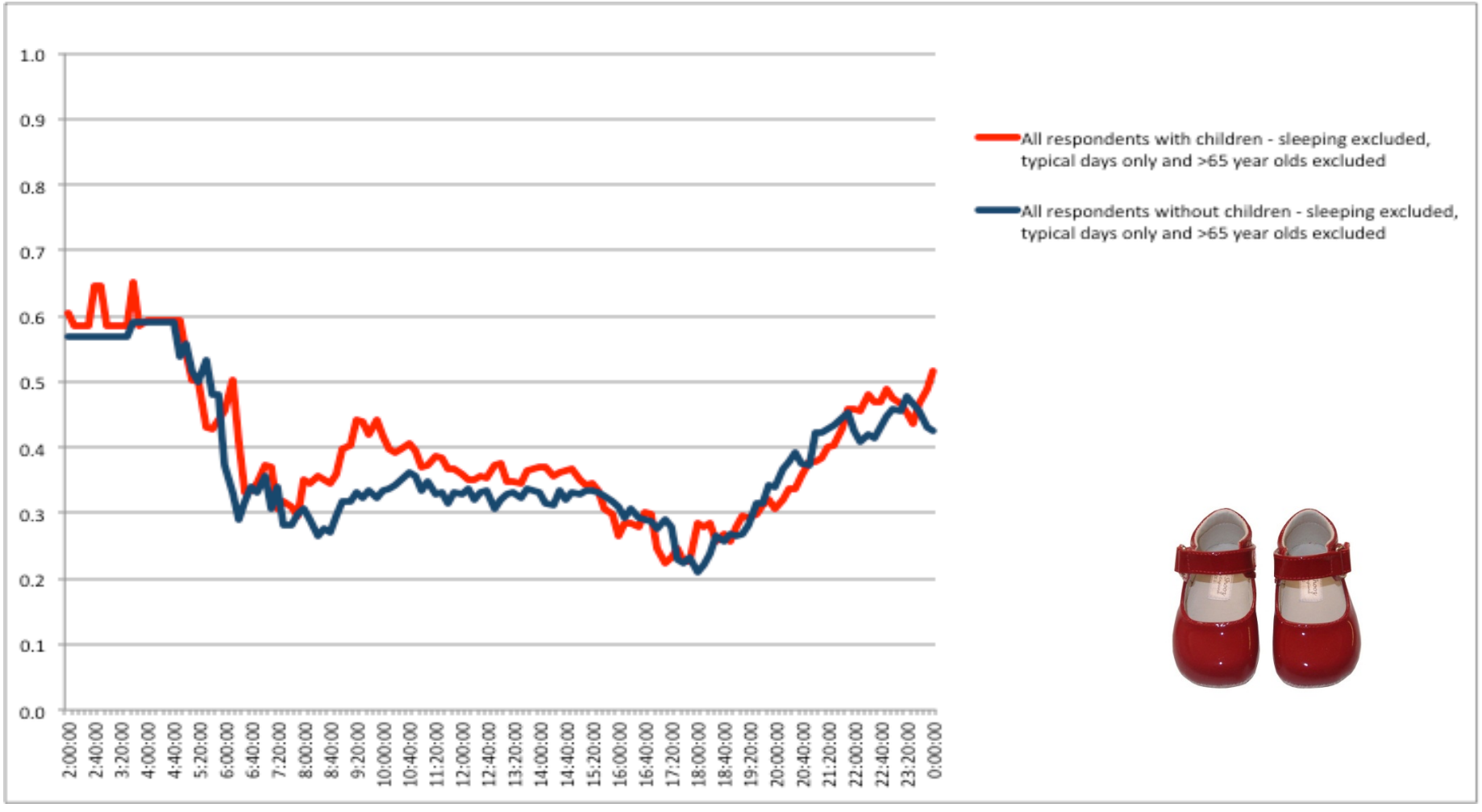
With children

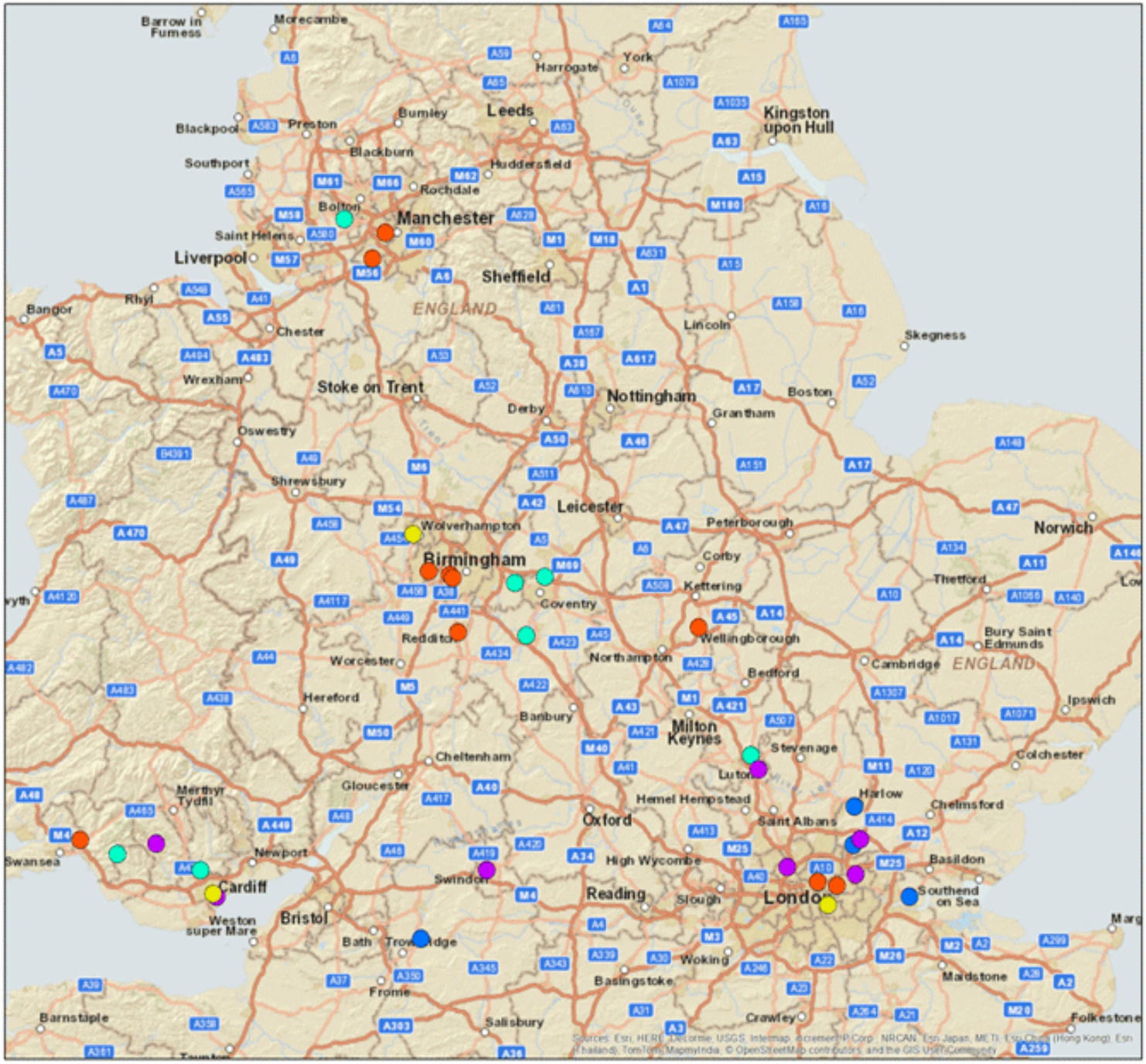
Without children





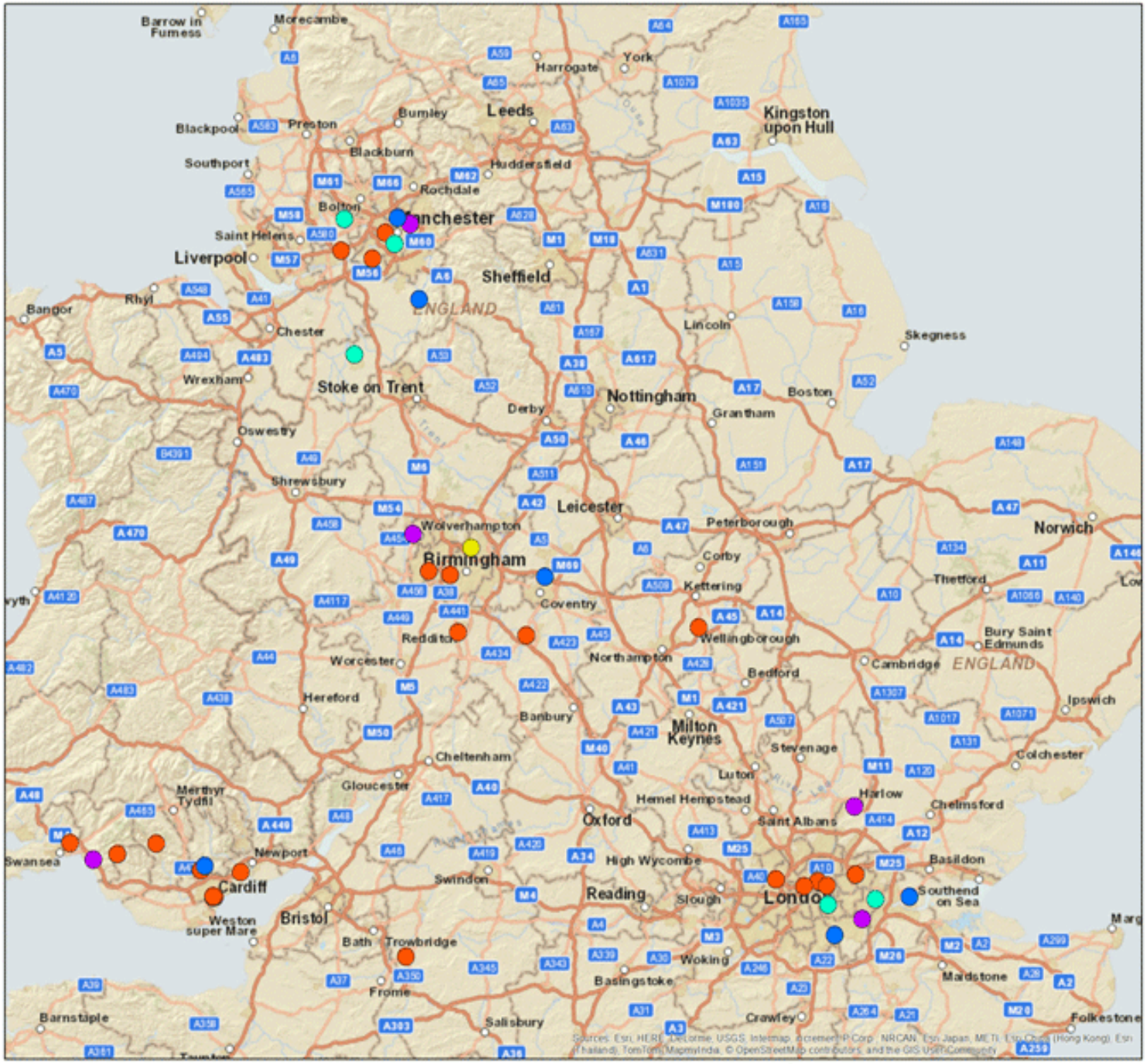
Synchronisation index: with or without children





High energy-consuming (primary) activities of households without children @ 8 AM

- Preparing food and drinks, cooking, washing up
- Washing, dressing/undressing etc.
- Washing, ironing or mending clothes etc.
- Maintenance of house, DIY, gardening
- Travelling: car
- Travelling: scooter/motorcycle
- Travelling: bus/tram
- Travelling: train/tube
- Work for your job (includes paid and unpaid overtime, work brought home)
- Watching TV and videos/DVDs, listening to radio or music
- Using a computer or accessing the internet



High energy-consuming (primary) activities of households without children @ 9 AM

- Preparing food and drinks, cooking, washing up
- Washing, dressing/undressing etc.
- Cleaning, tidying house
- Washing, ironing or mending clothes etc.
- Travelling: car
- Travelling: bus/tram
- Travelling: train/tube
- Work for your job (includes paid and unpaid overtime, work brought home)
- Watching TV and videos/DVDs, listening to radio or music
- Using a computer or accessing the internet

Findings and implications

- The analysis indicates that households with children exhibit greater synchronisation and predictability in their daily routines than households without children, while women's activities are more fragmented than men's through much of the day;

- The length of the working day varies across socio-demographic divisions such as gender or whether respondents have children;

- This has implications for the potential to shift the timing of energy demand at a household level, given the difficulties of managing such aggregate effects linked to gender or the absence / presence of children.