

# Modelling the change in contact matrices

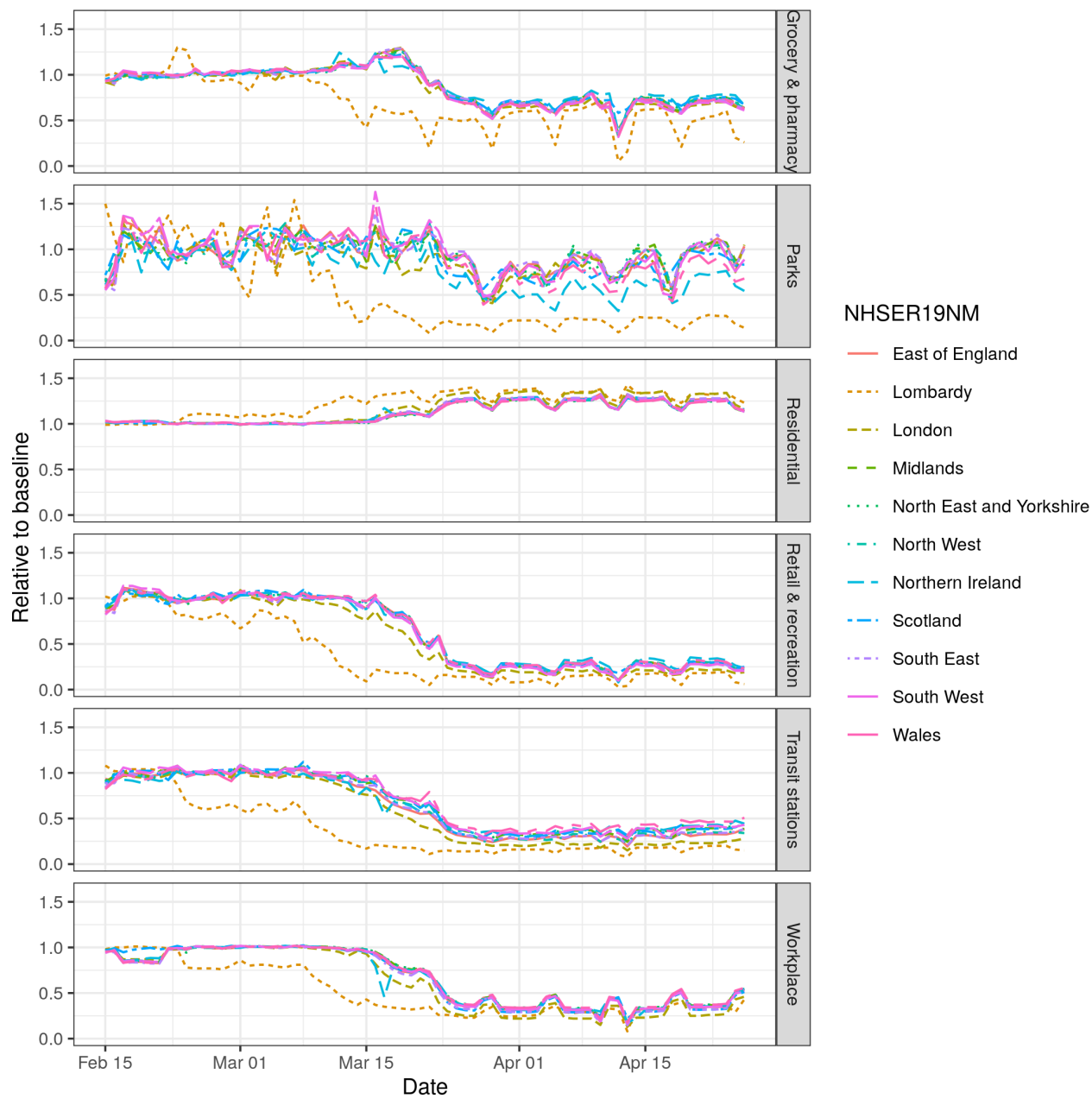


Figure 1: Changes in different activities as per the Google mobility data. The google mobility data is provided by local authority. To calculate the activity by region we calculated the mean activity weighted by population for the relevant locations. The different panels match different activities measured by google mobility data.

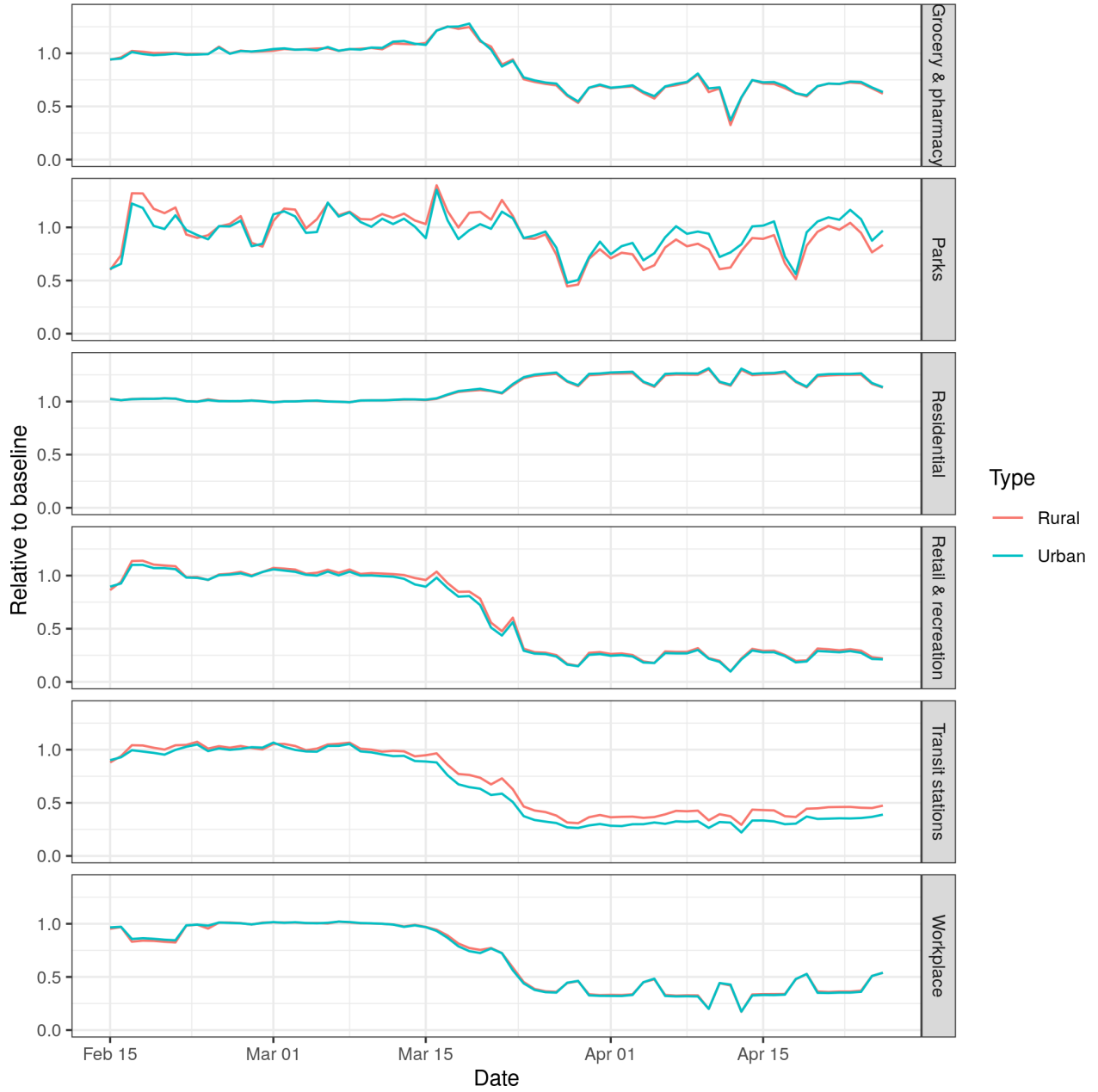


Figure 2: Changes in different activities as per the Google mobility data. Looking at urban versus rural locations in England. This is based on (England only) ONS data that gives a rural/urban score for many local authorities. We used this to calculate the mean adherence for each community (weighted by population).

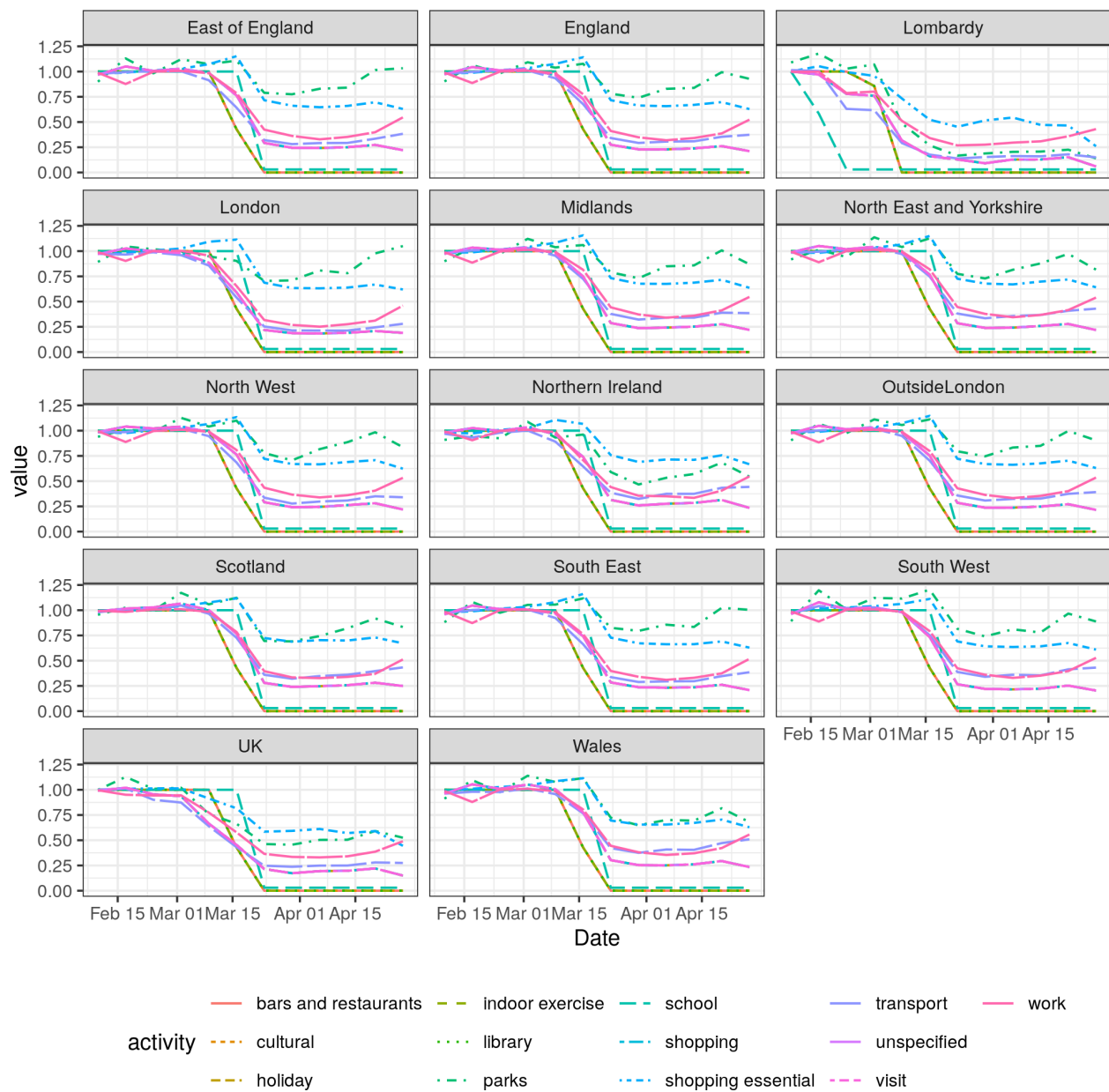


Figure 3: Changes in activities by region. These changes are informed by changes in Google mobility monitored activities (averaged by week) and data from other sources (e.g. Department for Education). See Table 2 for more details on the mapping.

Table 1: All contacts at home versus the contacts at home, when contacts are limited by the maximum number of contacts with household members.

country	AgeGroup	Contacts at home	Max contacts with household members	fraction
Italy	[0,1)	5.500	2.167	0.394
	[1,5)	4.536	2.710	0.597
	[5,15)	4.874	2.916	0.598
	[15,25)	4.107	2.645	0.644
	[25,45)	4.078	2.318	0.568
	[45,65)	3.467	2.000	0.577
	[65,75)	4.152	0.970	0.234
	[75,+)	3.929	0.429	0.109
United Kingdom	[0,1)	5.643	2.857	0.506
	[1,5)	4.295	2.808	0.654
	[5,15)	4.980	2.970	0.596
	[15,25)	4.206	2.675	0.636
	[25,45)	4.125	2.388	0.579
	[45,65)	3.767	1.524	0.405
	[65,75)	3.614	1.045	0.289
	[75,+)	3.571	0.714	0.200

## Home visits

To estimate the fraction of contacts at home with other household members versus the contacts with others (e.g. visitors), we calculate the mean number of contacts at home (Table 1). Next, we limited numbers to household size minus one ( $\hat{c}_i = \min(h_i - 1, c_i)$ ), i.e. the maximum number of contacts any participant can have with just household members and calculated the mean contacts based on that value. Note that this provides a conservative estimate of the fraction of contacts from visits, because some participants will not have met all their household members during the day.

Table 2: The values used for the different activities identified by the time use survey. For the school activity we used the data from the Department for Education. Some were set to zero if it was clear that these locations were closed (bars, indoor exercise etc.). Others were easy to match up with Google mobility measured activities (Transport, work, parks and shopping.). Finally, for some of the activities we have no good available data. Here they were matched to the Google mobility activity that was seen as most indicative of behaviour. For example, visits are unlikely to have stopped completely. Instead the Retail & recreation value is used, because this is the action that is subjectively closest related. Note that the activities which have the most effect on the reproductive number are school, work, visits and unspecified.

activity	UK	Lombardy
school	0.03	0.03
home	1	1
alone	1	1
bed	1	1
bars and restaurants	0	0
cultural	0	0
indoor exercise	0	0
library	0	0
visit	Retail & recreation	Retail & recreation
parks	Parks	Parks
holiday	Retail & recreation	Retail & recreation
shopping	Retail & recreation	Retail & recreation
shopping essential	Grocery & pharmacy	Grocery & pharmacy
unspecified	Retail & recreation	Retail & recreation
work	Workplace	Workplace
transport	Transit stations	Transit stations

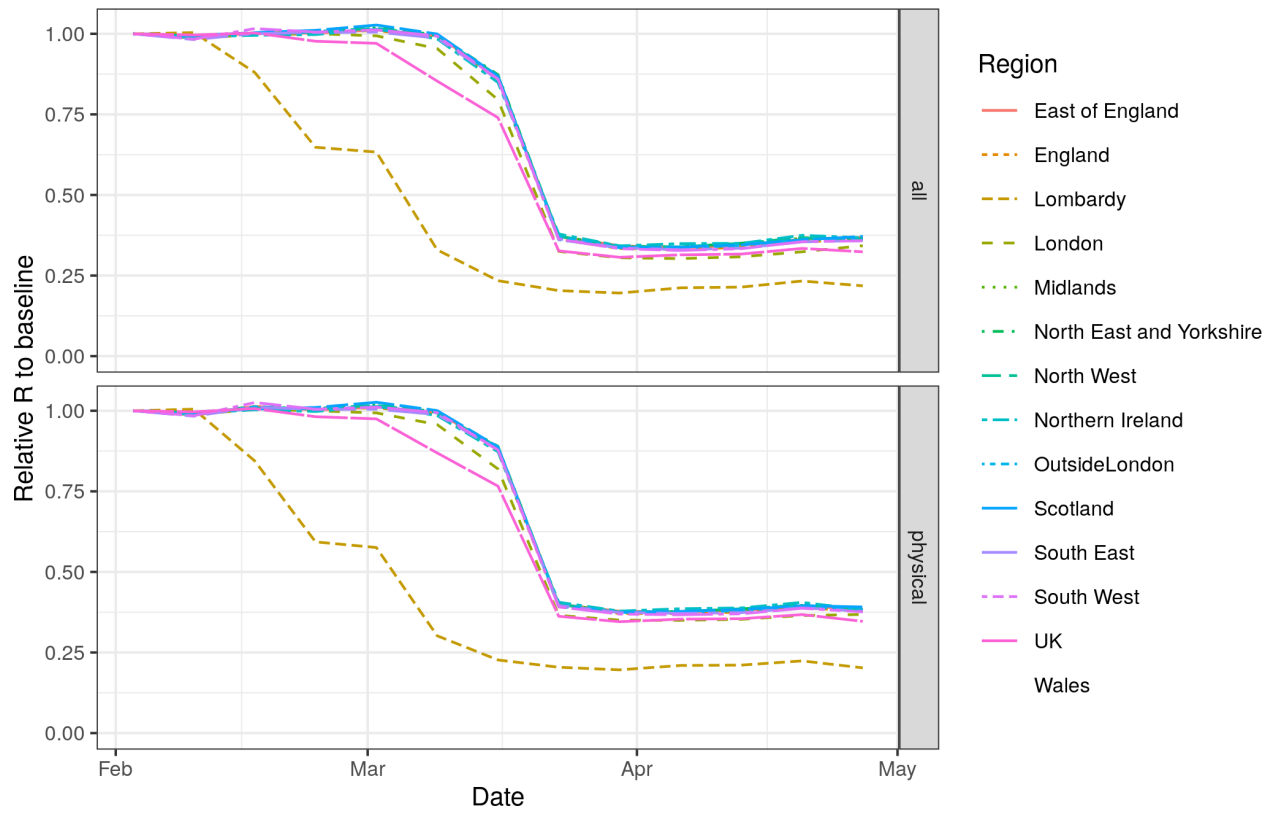


Figure 4: Change in relative R value over time by region using the weighted contact matrices.