MOBIS-COVID19/04: Results as of 27/04/2020

Joseph Molloy[1], Christopher Tchervenkov[2], Beaumont Schoeman[2], Beat Hintermann[2], and Kay W. Axhausen[2]

[1]IVT ETH Zurich
[2]Affiliation not available

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Abstract

On March 16, 2020, 3700 participants who completed the MOBIS study between September 2019 and January 2020 were invited to reinstall the GPS Logger and Travel Diary App 'Catch-My-Day', developed by MotionTag, to record their mobility behaviour during the period of special measures implemented to control the spread of the Corona Virus. The first 4 weeks of mobility data from the original MOBIS Study is taken for each participant as a baseline against which to compare current mobility patterns. These 4 weeks start place anywhere between 1st September and 15th November, depending on the participant. Only trips in Switzerland are currently considered, although data on cross border travel is available.

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Joseph Molloy

Christopher Tchervenkov

Beaumont Schoeman

Beat Hintermann

Kay W. Axhausen

Institut für Verkehrsplanung und Transportsysteme
Institute for Transport Planning and Systems

ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

MOBIS-COVID19/04

Joseph Molloy
IVT
ETH Zürich
CH-8093 Zurich
`joseph.molloy@ivt.baug.ethz.ch`

Christopher Tchervenkov
IVT
ETH Zurich
CH-8093 Zurich
`christopher.tchervenkov@ivt.baug.ethz.ch`

Beaumont Schoeman
WWZ
University of Basel
CH-4002 Basel
`b.schoeman@unibas.ch`

Beat Hintermann
WWZ
University of Basel
CH-4002 Basel
`b.hintermann@unibas.ch`

Kay W. Axhausen
IVT
ETH Zurich
CH-8093 Zurich
`axhausen@ivt.baug.ethz.ch`

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Abstract

To slow down the spread of the Coronavirus, the population has been instructed to stay at home if possible. This measure consequently has a major impact on our daily mobility behaviour. But who is being affected, and how? The MOBIS-COVID-19 research project, an initiative of ETH Zurich and the University of Basel, is a continuation of the original MOBIS study. The aim of the project is to get a picture of how the crisis is affecting mobility and everyday life in Switzerland.

Keywords

GPS logger; Travel diary app; COVID-19; Corona virus; MOBIS; Mobility behaviour; Switzerland

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MOBIS-COVID19/04

Joseph Molloy
IVT
ETH Zürich
CH-8093 Zurich
`joseph.molloy@ivt.baug.ethz.ch`

Christopher Tchervenkov
IVT
ETH Zurich
CH-8093 Zurich
`christopher.tchervenkov@ivt.baug.ethz.ch`

Beaumont Schoeman
WWZ
University of Basel
CH-4002 Basel
`b.schoeman@unibas.ch`

Beat Hintermann
WWZ
University of Basel
CH-4002 Basel
`b.hintermann@unibas.ch`

Kay W. Axhausen
IVT
ETH Zurich
CH-8093 Zurich
`axhausen@ivt.baug.ethz.ch`

April 2020

Zusammenfassung

Um die Ausbreitung des Coronavirus zu verlangsamen ist die Bevölkerung angewiesen worden, wenn möglich zu Hause zu bleiben. Diese Massnahme hat daher einen grossen Einfluss auf unser tägliches Mobilitätsverhalten. Doch wer ist davon betroffen und wie? Das Forschungsprojekt MOBIS-COVID-19, eine Initiative der ETH Zürich und der Universität Basel, ist eine Weiterführung der originalen MOBIS-Studie. Ziel des Projekts ist es, ein Bild zu erhalten, wie sich die Krise auf die Mobilität und das Alltagsleben in der Schweiz auswirkt.

Schlagworte

GPS logger; Travel diary app; COVID-19; Corona virus; MOBIS; Mobility behaviour; Switzerland

Zitierungsvorschlag

Introduction

On March 16, 2020, 3700 participants who completed the MOBIS study between September 2019 and January 2020 were invited to reinstall the GPS Logger and Travel Diary App 'Catch-My-Day', developed by MotionTag, to record their mobility behaviour during the period of special measures implemented to control the spread of the Corona Virus. The first 4 weeks of mobility data from the original MOBIS Study is taken for each participant as a baseline against which to compare current mobility patterns. These 4 weeks start place anywhere between 1st September and 15th November, depending on the participant. Only trips in Switzerland are currently considered, although data on cross border travel is available.

The following figure shows the number of registered and tracking participants per day. A running panel of around 250 participants were already tracking before the sample was re-invited. This allows results for the weeks before the MOBIS:COVID-19 study was officially started, although the sample size is a lot smaller, and hence the results.

In the MOBIS study, participants were only eligible if they used a car at least 3 days a week - which skews the sample away from the Swiss general population.

The number of tracking participants each day used to calculate the average daily values includes all participants who recorded tracks before or after that date. This allows the consideration of those who stay at home while still allowing for survey dropouts.

The GPS Travel diary used, Catch-My-Day (for iOS and Android) can have a 2-3 day delay before the tracks are available for analysis. The scaling by active participants accommodates for this, but the results of previous reports may change when the report is updated.

Participation

MOBIS:COVID-19 Registrations
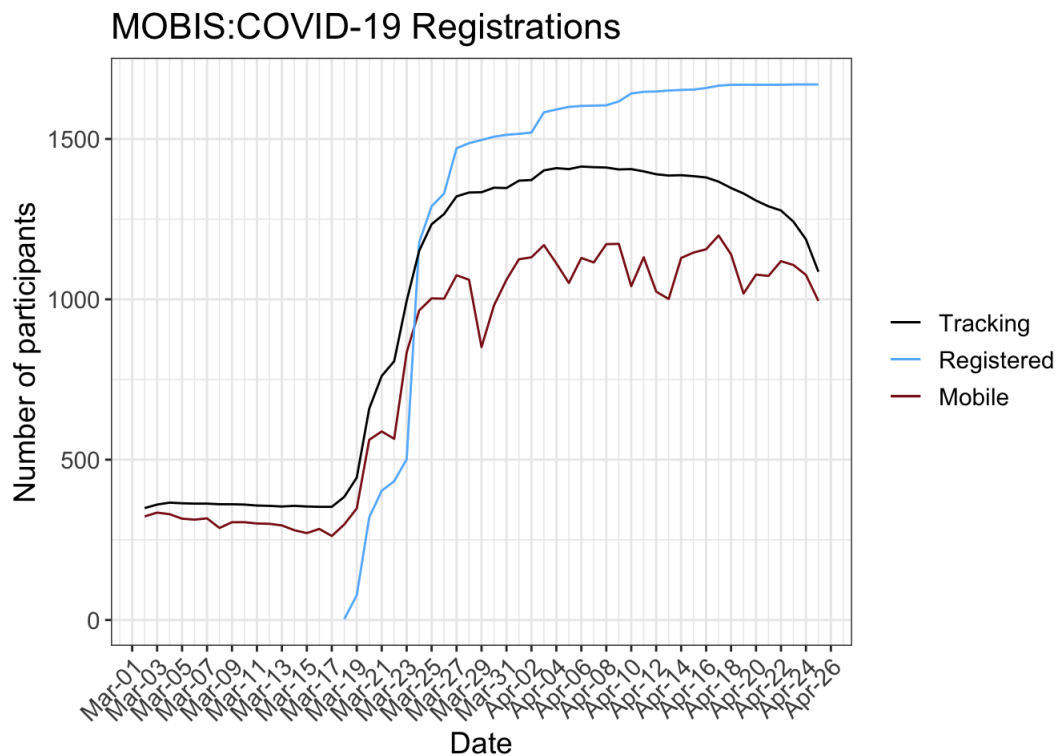
Differences in the distributions
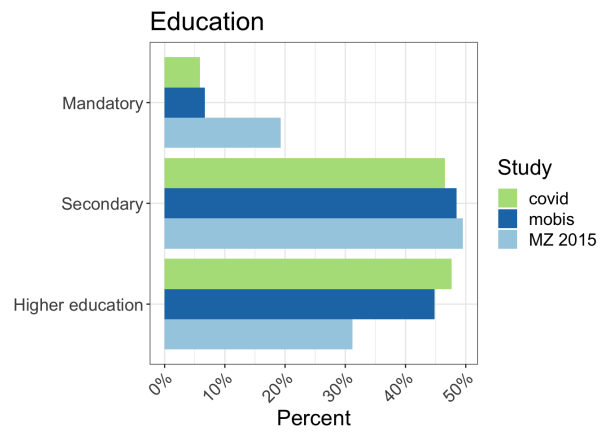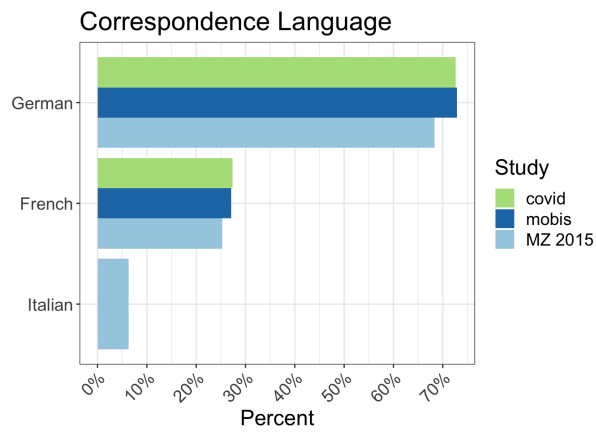
The following charts show the characteristics of the MOBIS:COVID-19 sample compared to the original MOBIS Sample. There are some small differences, but generally the samples are consistent. This chart will be extended to compare to the relevant census data.

Correspondence Language

Education

Gender

Household Size

Monthly Income

Employment status
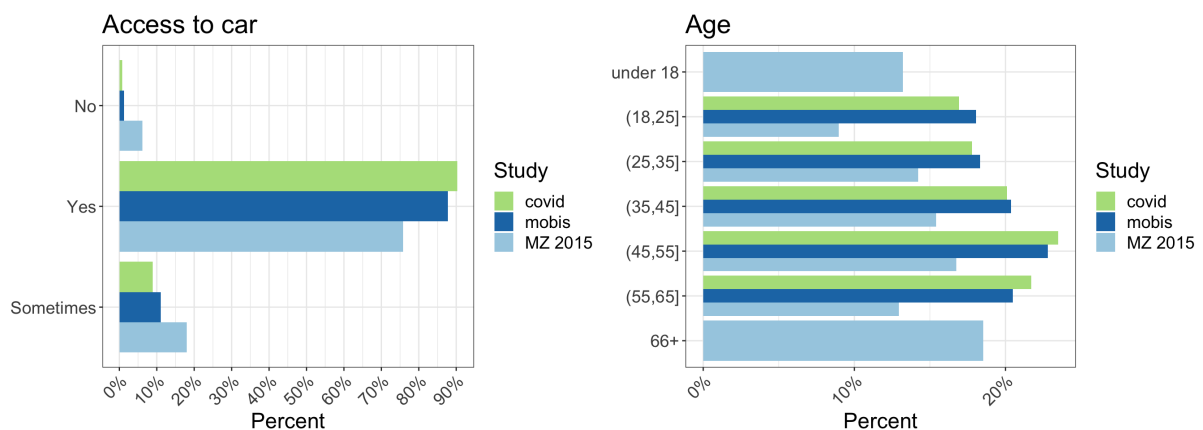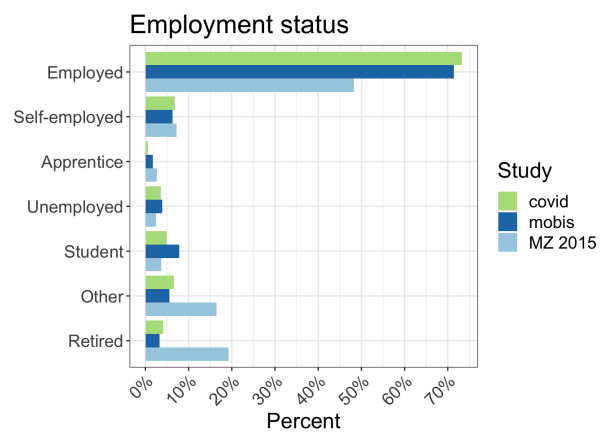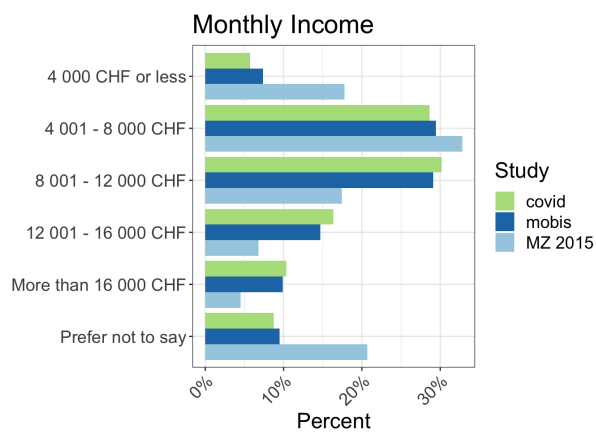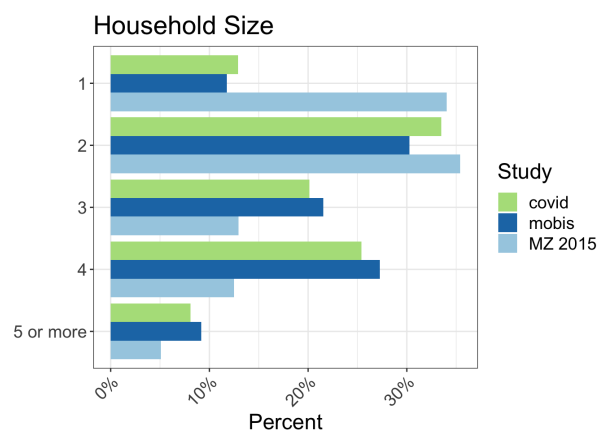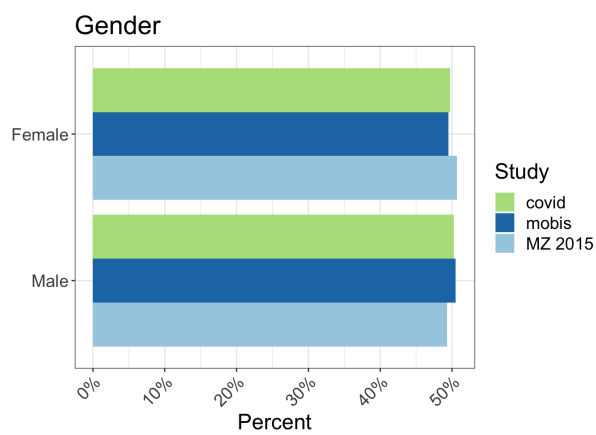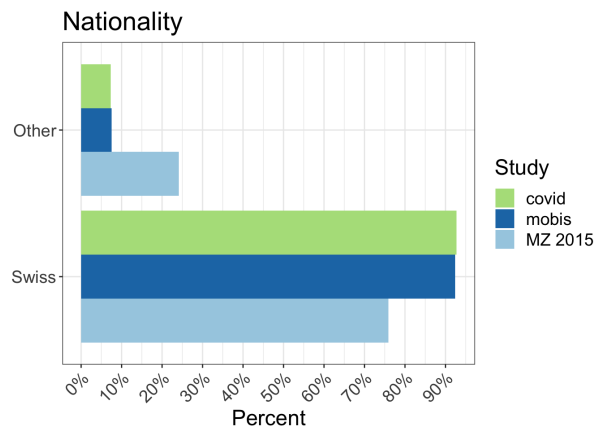
Table 1: Comparison with the last national travel diary Mikrozensus (MZ) 2015

	N		%	
	Covid	MZ	Covid	MZ
Aargau	81	4,325	5.0	7.6
Basel-Landschaft	182	1,940	11.3	3.4
Basel-Stadt	39	1,555	2.4	2.7
Berne	188	7,244	11.7	12.7
Fribourg	8	1,942	0.5	3.4
Geneva	125	3,062	7.8	5.4
Schwyz	17	1,005	1.1	1.8
Solothurn	17	1,813	1.1	3.2
Vaud	290	5,303	18.0	9.3
Zurich	660	10,410	41.0	18.2
Other	3	18,491	0.2	32.4

Average daily distance

Average daily km travelled by gender

Active days

Mobile participants per day
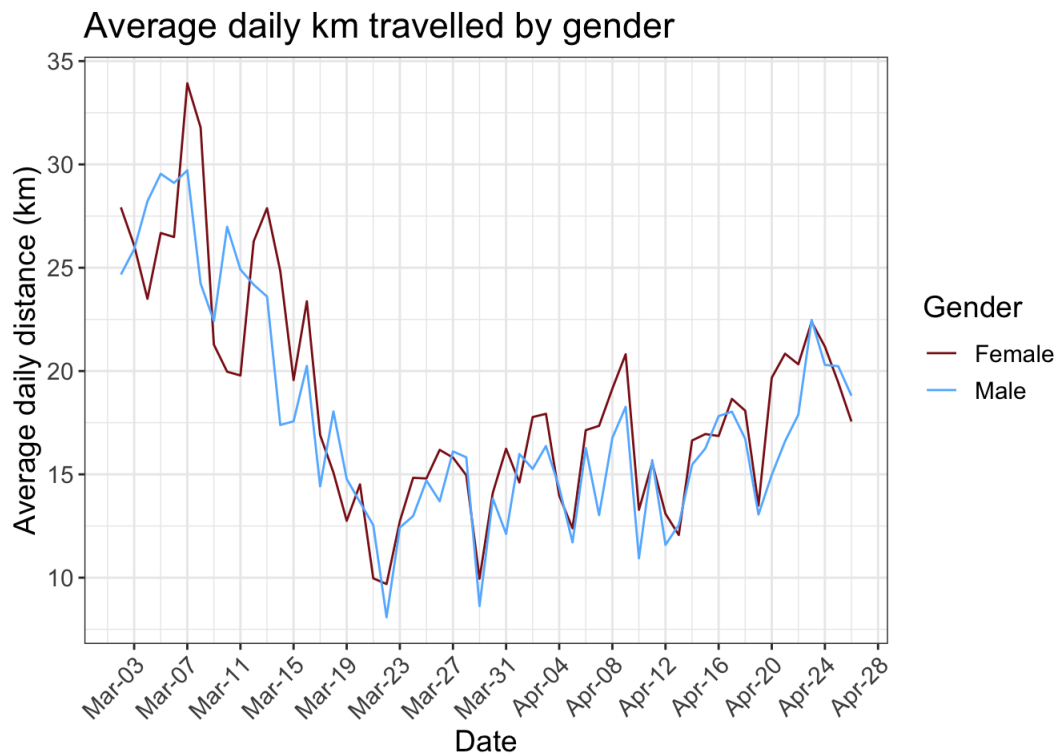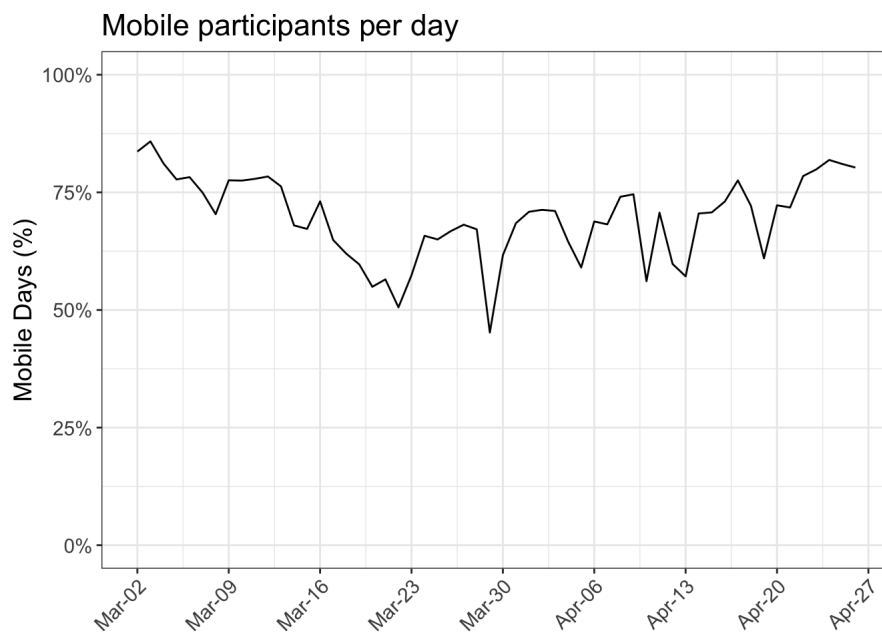
Change in kilometers travelled by transport mode

Change in kilometers travelled by:

Correspondence Language

Education

Employment status

Gender

Household Size

Monthly Income
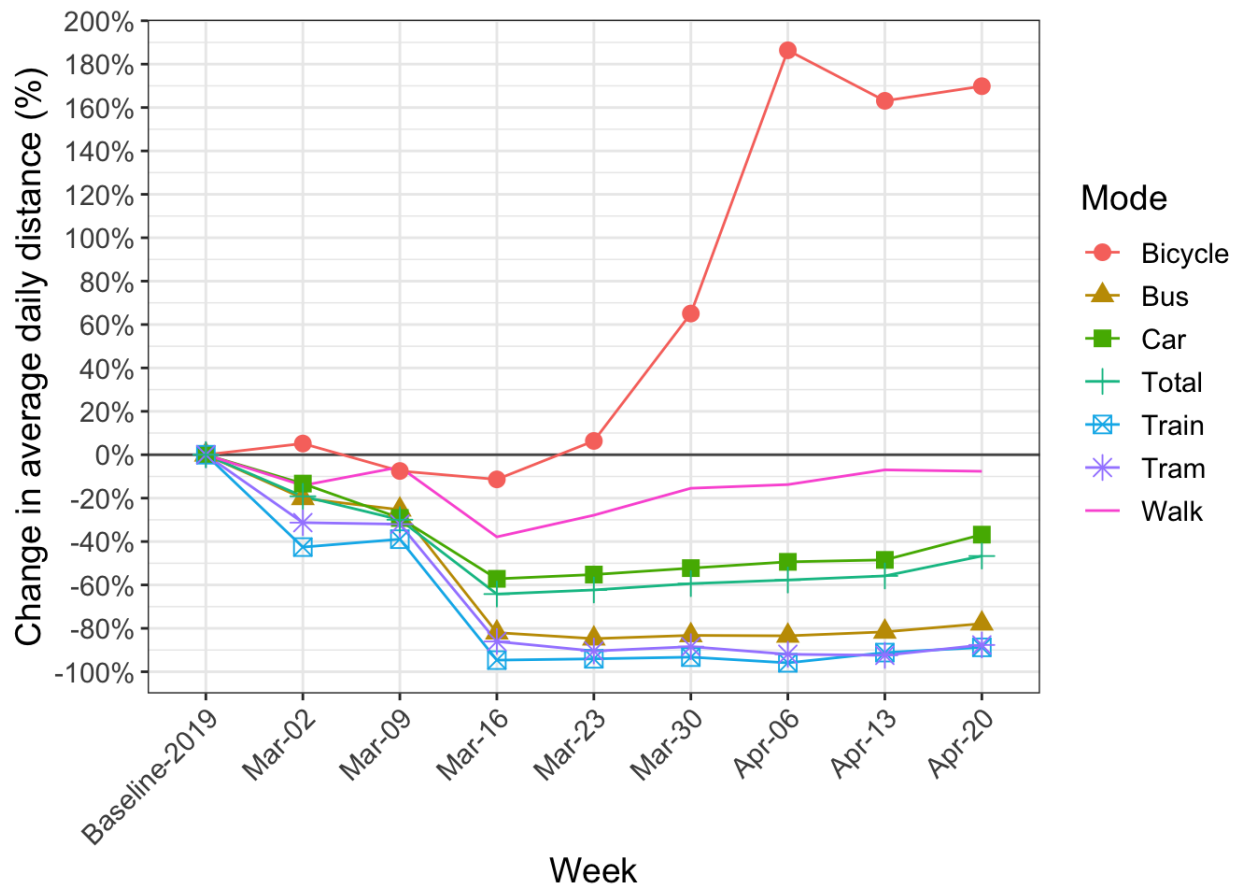
Nationality
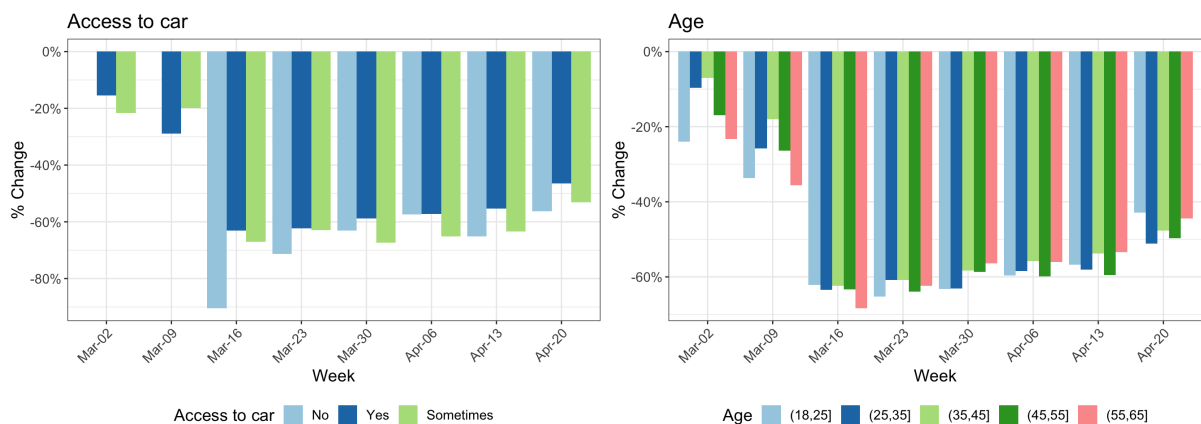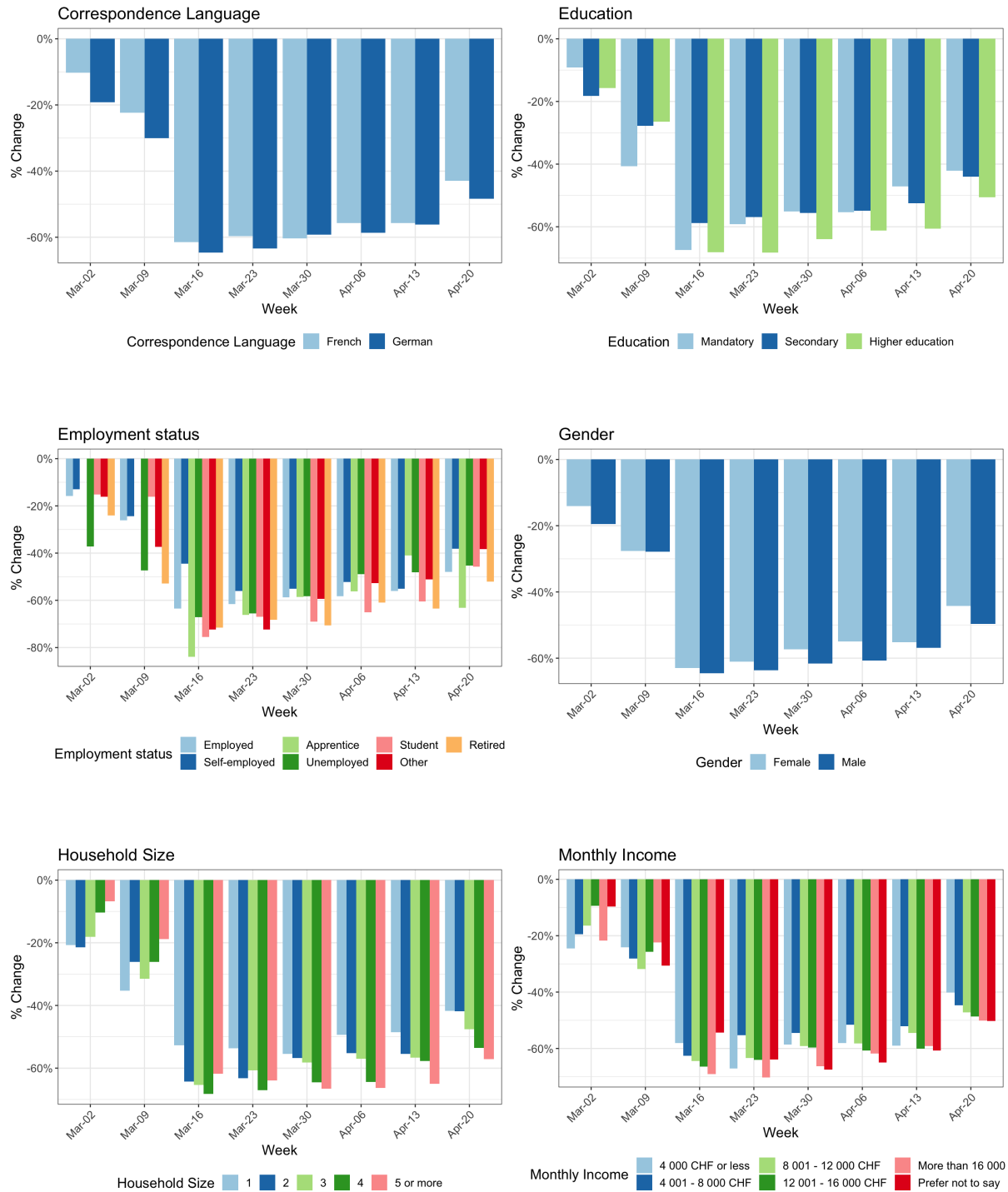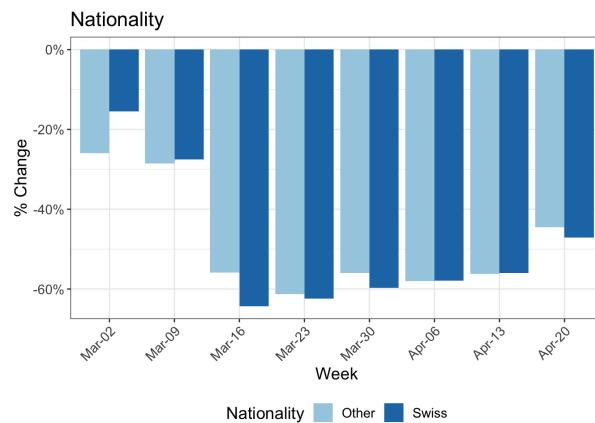
Reduction in kilometers travelled by Canton

Table 2: Change in kilometers travelled by home canton (%)

| Canton	N	Mar-02	Mar-09	Mar-16	Mar-23	Mar-30	Apr-06	Apr-13	Apr-20
Aargau	**60**	-25	-41	-71	-58	-50	-57	-55	-41
Basel-Landschaft	**150**	-14	-9	-60	-61	-59	-60	-55	-52
Basel-Stadt	**31**	-14	-36	-70	-75	-68	-62	-67	-51
Berne	**151**	-30	-33	-66	-60	-57	-57	-50	-45
Fribourg	**6**	-61	-23	-63	-56	-61	-52	-44	-60
Geneva	**103**	9	-44	-68	-61	-58	-65	-56	-43
Schwyz	**10**	-24	-13	-55	-70	-50	-49	-42	-29
Solothurn	**16**	-13	-41	-62	-65	-53	-49	-50	-27
Vaud	**226**	-8	-22	-65	-70	-68	-65	-63	-53
Zurich	**545**	-17	-25	-60	-59	-57	-53	-54	-43

Trip duration by transport mode and gender

Table 3: Median trip duration by gender and mode (minutes)

Mode	Gender	Baseline-2019	Mar-02	Mar-09	Mar-16	Mar-23	Mar-30	Apr-06	Apr-13	Apr-20
Bicycle	**Female**	15	15	16	14	19	27	31	39	27
	Male	14	14	15	25	24	28	36	33	30
Bus	**Female**	11	7	8	4	5	6	5	6	5
	Male	11	8	9	7	7	6	7	7	6
Car	**Female**	52	41	38	36	36	36	37	36	38
	Male	51	47	42	34	34	35	35	35	35
Train	**Female**	35	31	35	19	28	28	16	18	29
	Male	35	25	33	12	26	23	19	25	23
Tram	**Female**	15	13	16	8	14	14	9	7	12
	Male	18	20	17	12	11	13	12	11	12
Walk	**Female**	17	22	21	19	18	21	21	21	19
	Male	17	20	20	16	18	20	21	21	19

Average trip length by transport mode (km)
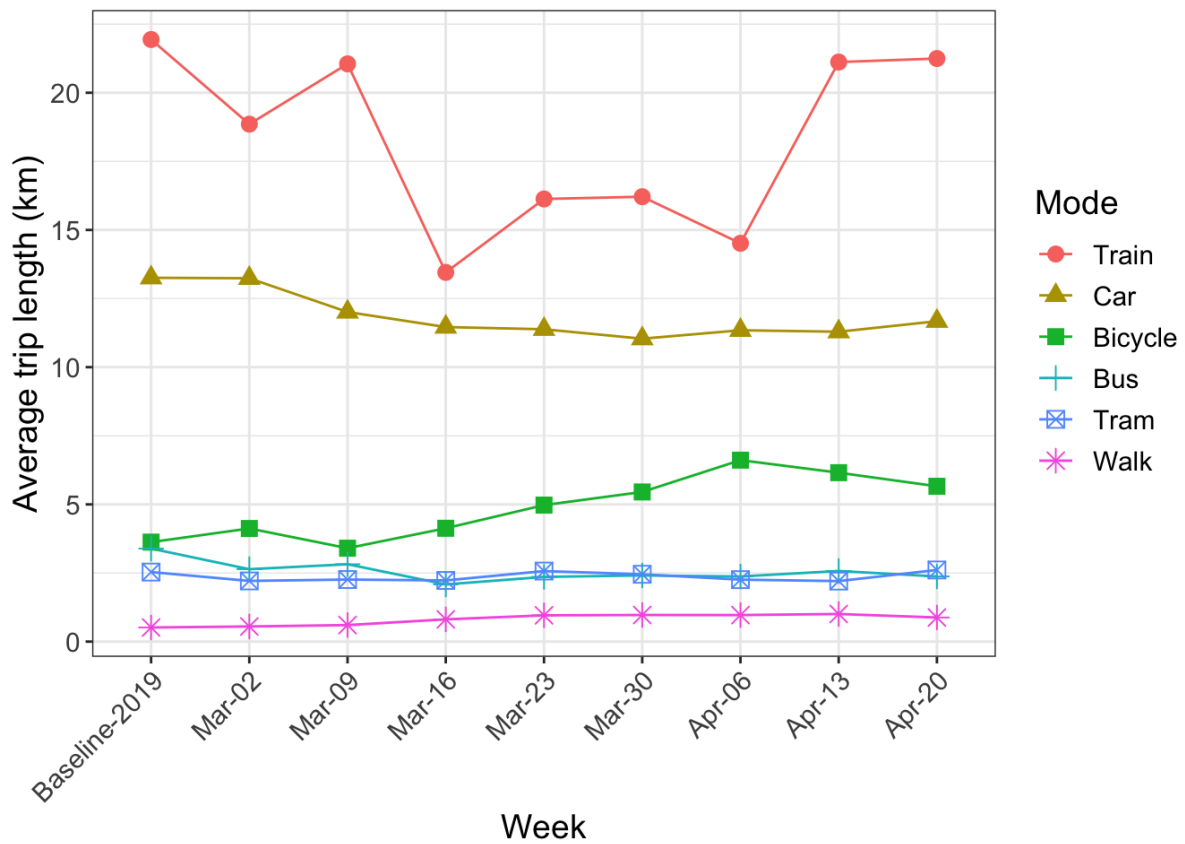
Activity space and daily travel radius

A commonly used definition of the activity space is the 95% confidence ellipse of the activity locations, in this case weighted by duration. In the following analysis, the activities at the home location are included, for those that had the app activated on that day. This is an important metric which gives an idea of the area in which travel is being performed. The daily travel radius is also presented.
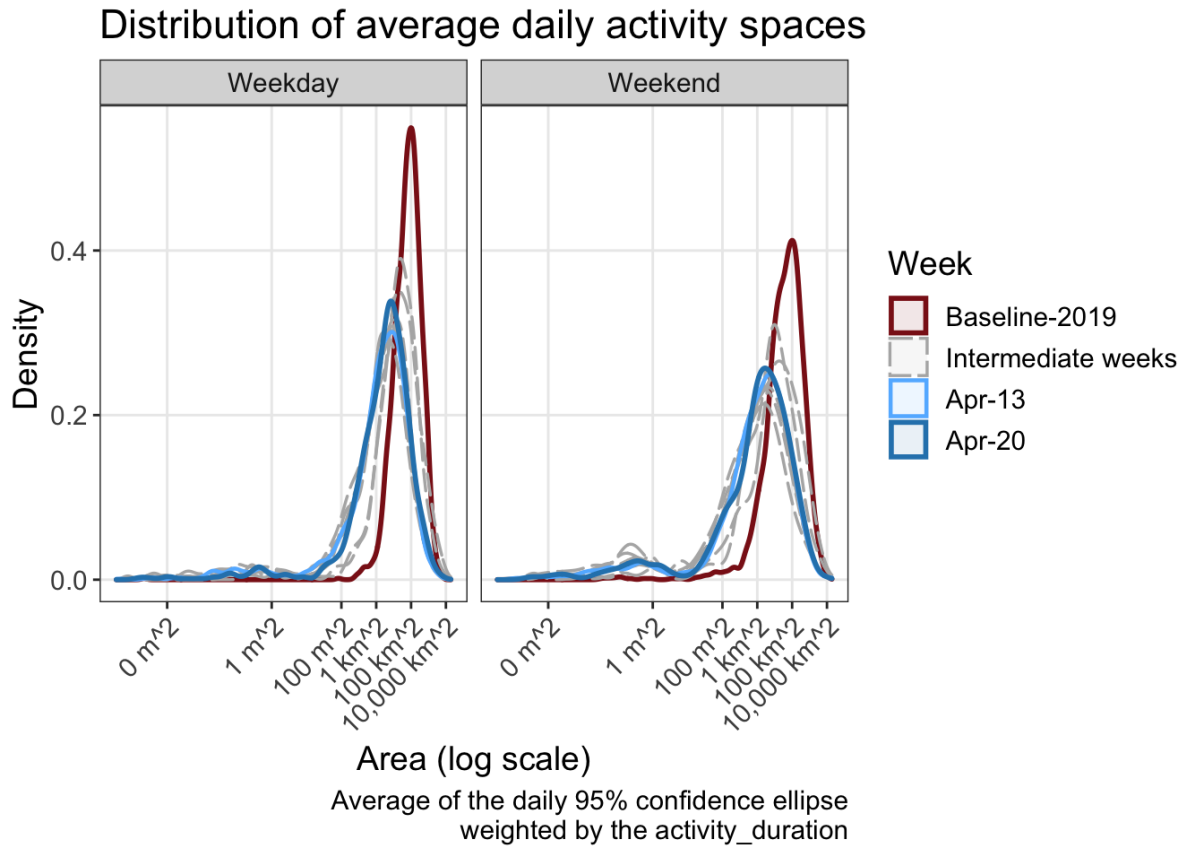
Distribution of average daily activity spaces

Area (log scale)

Average of the daily 95% confidence ellipse
weighted by the activity_duration

Table 4: Change in average activity space area and average daily radius (%)

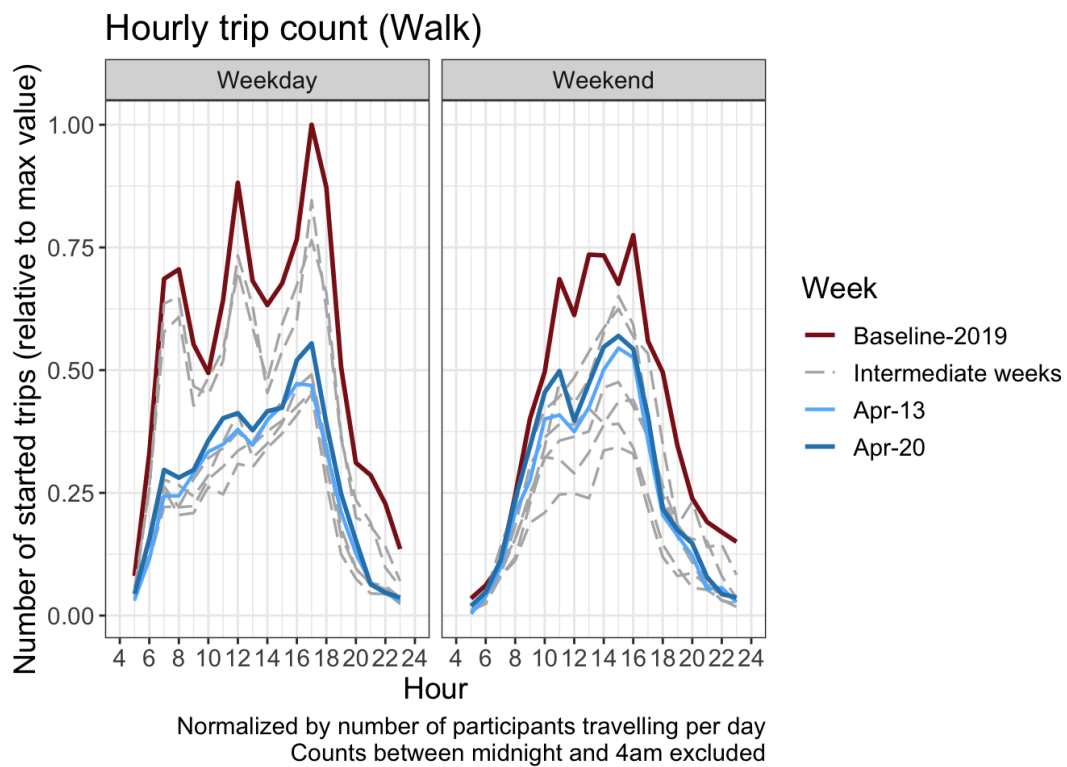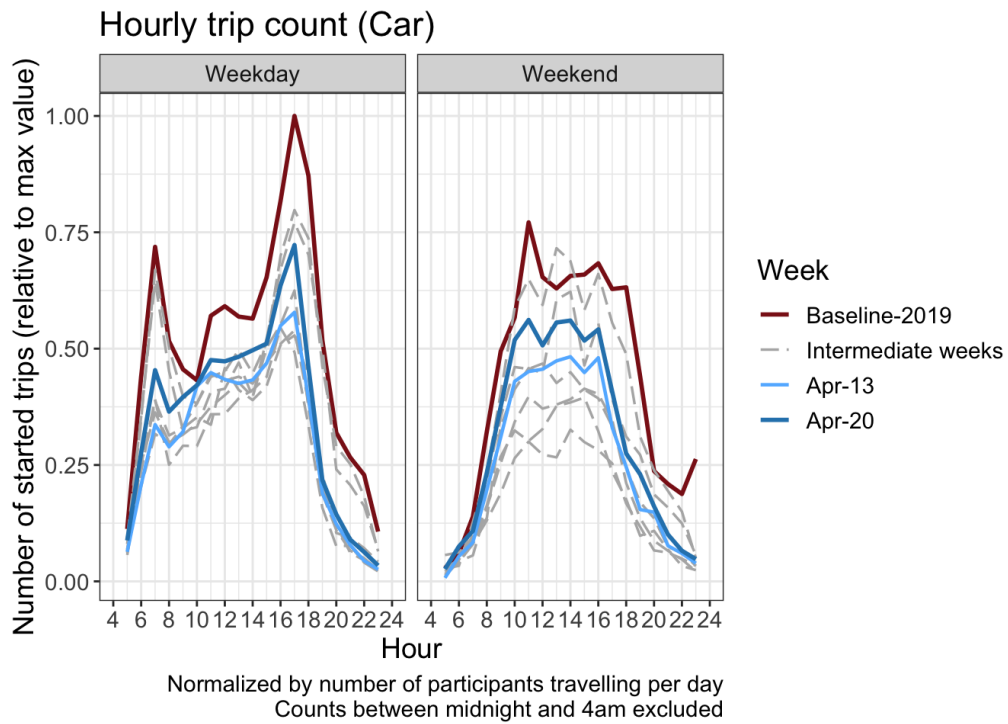| Week		# Activities/day	Change	Area (km^2)	Change	Daily Radius (km)	Change
Baseline-2019	Weekday	4.75		199.68		10.08	
	Weekend	3.93		227.77		9.91	
Mar-02	Weekday	3.98	-16%	188.70	-5%	8.70	-14%
	Weekend	3.46	-12%	128.24	-44%	8.06	-19%
Mar-09	Weekday	3.97	-16%	119.97	-40%	7.39	-27%
	Weekend	3.19	-19%	81.71	-64%	5.90	-40%
Mar-16	Weekday	2.87	-40%	31.27	-84%	3.96	-61%
	Weekend	2.02	-49%	16.77	-93%	2.28	-77%
Mar-23	Weekday	2.67	-44%	34.51	-83%	3.60	-64%
	Weekend	2.23	-43%	31.11	-86%	3.17	-68%
Mar-30	Weekday	2.87	-39%	41.02	-79%	3.82	-62%
	Weekend	2.54	-35%	33.07	-85%	3.67	-63%
Apr-06	Weekday	2.94	-38%	37.09	-81%	4.08	-60%
	Weekend	2.77	-29%	43.30	-81%	3.80	-62%
Apr-13	Weekday	2.97	-37%	40.90	-80%	4.33	-57%
	Weekend	2.78	-29%	52.73	-77%	4.24	-57%
Apr-20	Weekday	3.28	-31%	57.93	-71%	4.96	-51%
	Weekend	2.86	-27%	43.68	-81%	4.41	-56%

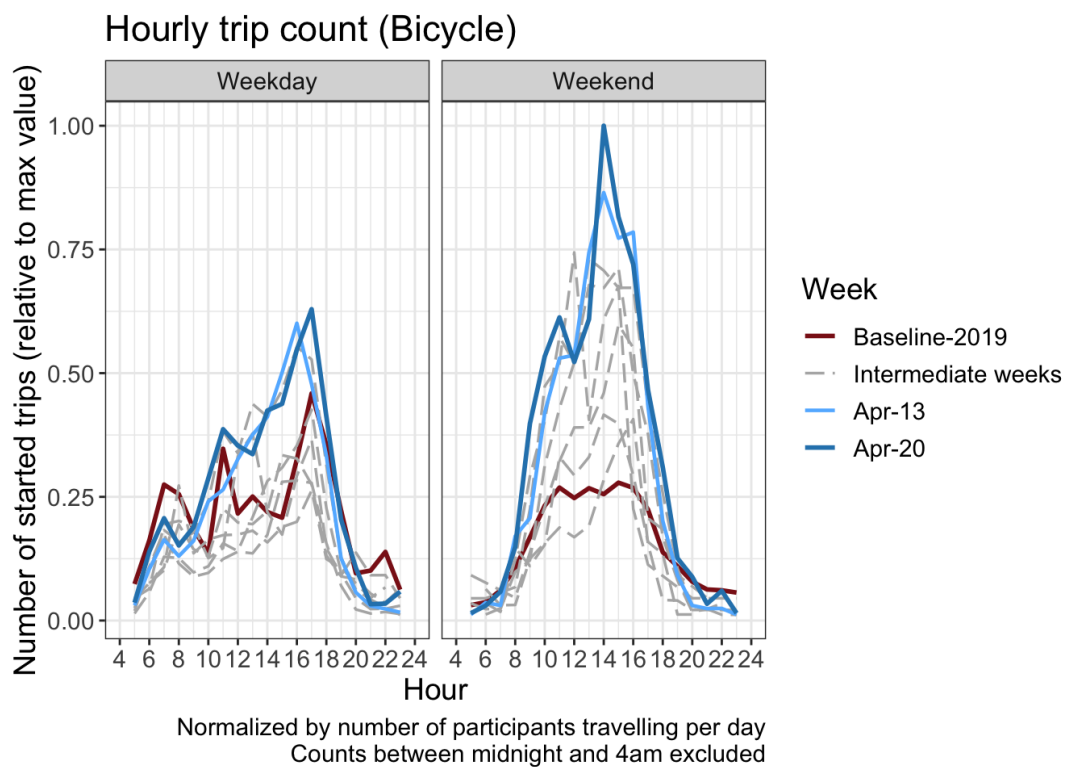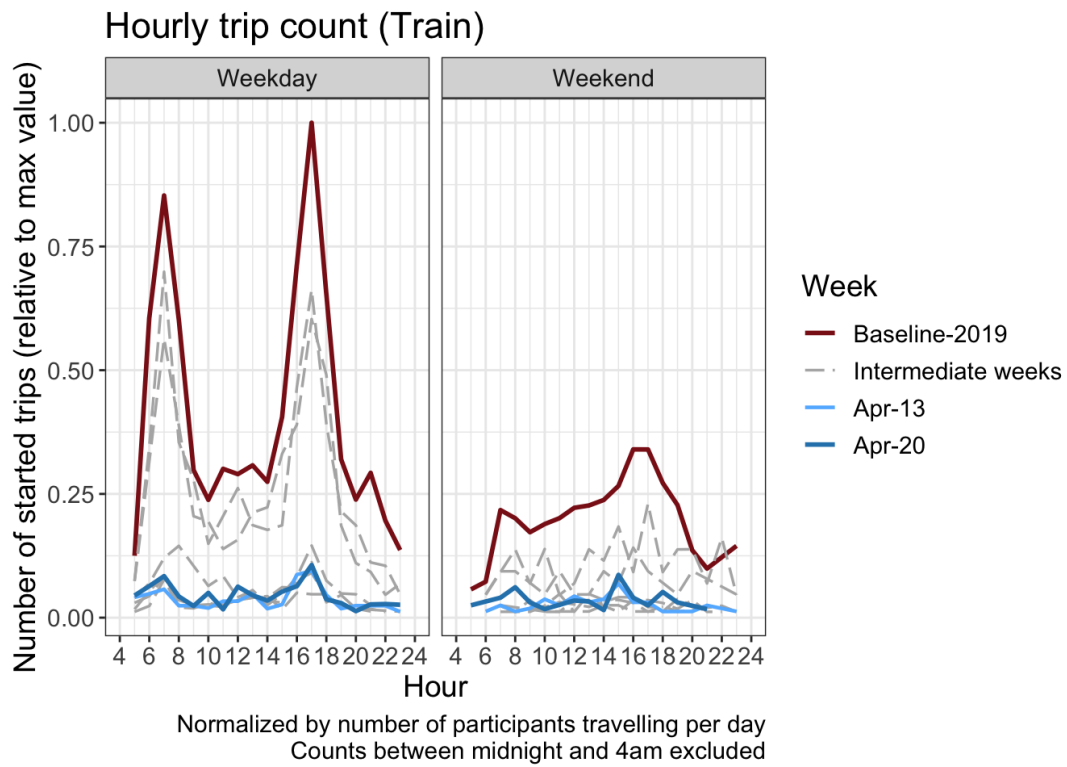Table 5: Change in median weekly activity space by type of day and age class (km^2)

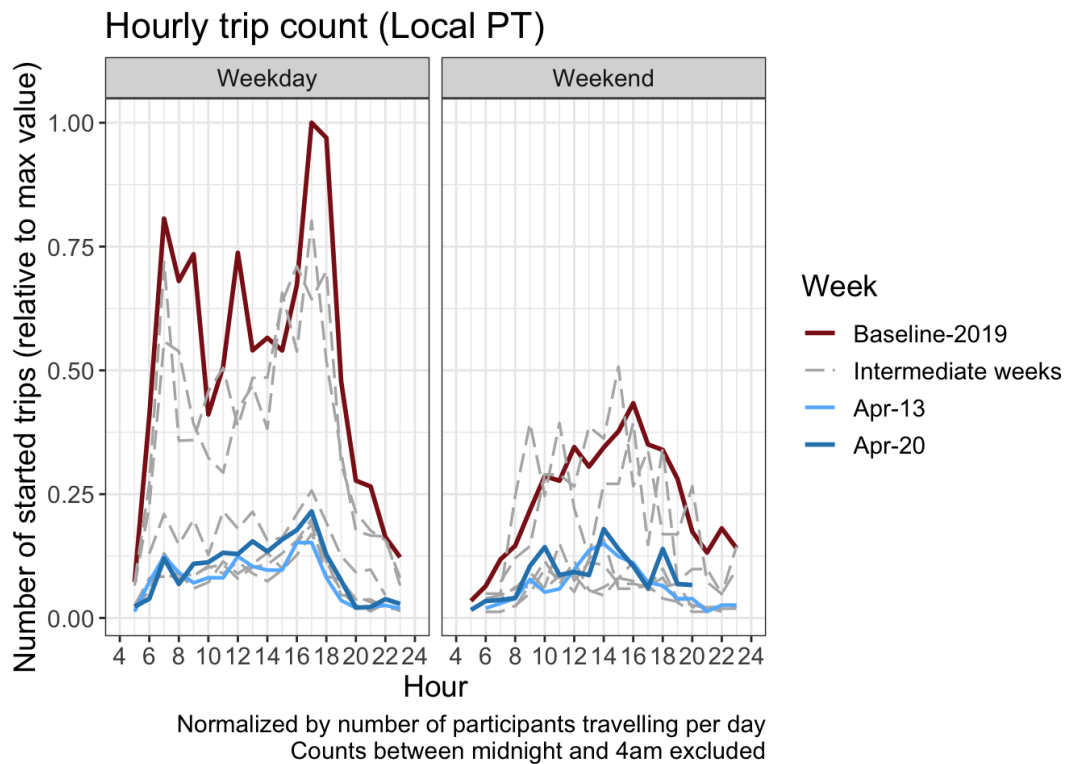| Age		2019	Mar-02	Mar-09	Mar-16	Mar-23	Mar-30	Apr-06	Apr-13	Apr-20
(18,25]	Weekday	63.3	35.9	48.1	6.9	2.6	3.0	5.7	7.9	10.6
	Weekend	35.6	5.8	9.8	0.6	0.9	0.8	1.2	1.3	2.4
(25,35]	Weekday	70.9	85.2	42.6	2.3	4.9	4.6	7.4	6.1	10.5
	Weekend	42.6	14.5	3.3	0.4	0.6	1.3	2.3	1.8	2.6
(35,45]	Weekday	76.3	36.4	75.0	6.8	3.3	7.6	8.2	10.8	11.3
	Weekend	24.3	29.9	20.5	0.4	1.6	0.8	1.4	1.5	4.2
(45,55]	Weekday	74.1	40.5	53.8	4.0	3.1	4.4	7.0	5.2	10.0
	Weekend	28.1	13.3	7.0	0.7	1.2	1.6	1.6	2.3	4.0
(55,65]	Weekday	67.0	64.0	46.4	7.3	2.8	5.8	5.1	7.1	8.6
	Weekend	21.3	9.1	8.7	0.1	1.2	1.1	1.2	3.8	3.1

Hourly counts

The number of trips started per hour. The y axis is normalized by the maximum hourly value in the graph.

Hourly trip count (Car)

Normalized by number of participants travelling per day
Counts between midnight and 4am excluded

Hourly trip count (Walk)

Normalized by number of participants travelling per day
Counts between midnight and 4am excluded

Hourly trip count (Train)

Normalized by number of participants travelling per day
Counts between midnight and 4am excluded

Hourly trip count (Bicycle)

Normalized by number of participants travelling per day
Counts between midnight and 4am excluded

Hourly trip count (Local PT)

Normalized by number of participants travelling per day
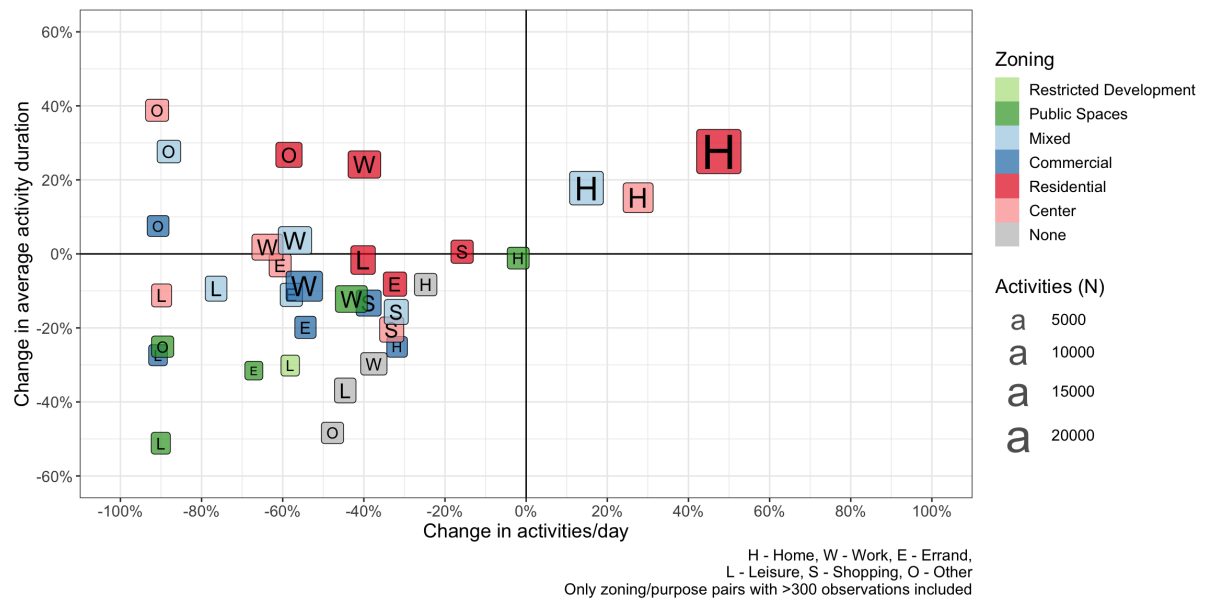Counts between midnight and 4am excluded

Activity types and zoning

Around 30% of activities were voluntarily labelled with their purpose by participants using the app. Work is ongoing to impute the purposes for the rest of the activities. Using simplification of the ARE development zoning classification, the activities are assigned with the closest zone classification within a 100m radius. The following graph shows how both the activity duration and the number of activities has changed from the baseline period in 2019 to the COVID-19 period.

Please note that only stationary leisure activities are included, not walking, cycling, hiking etc.

H - Home, W - Work, E - Errand,
L - Leisure, S - Shopping, O - Other
Only zoning/purpose pairs with >300 observations included