

Table S1. Criteria, source of information, and collection and processing methods of data from the countries included in the study

Country	Criteria under which it was included	Source of information about the COVID-19 cases and stringency of lockdown of the country	Method of collection & Processing
United States of America	a	The number of COVID-19 cases during the study period for all the included countries were obtained from the following repository: https://datahub.io/core/covid-19#readme The primary sources of the data for the above repository are mentioned in the same link shared above. The data on stringency index of the lockdown was obtained from the following tool: https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker All data are available in the public domain for download.	The data which was available in the CSV format was downloaded. The data of the countries during the study period was extracted, cleaned and analyzed by using Microsoft Excel v19.0, R v3.6.2 (RStudio v1.1.383), and SPSS v21.0.
Spain	a		
United Kingdom	a,b		
Canada	a		
Italy	a,b		
Germany	a		
Brazil	a		
Turkey	a		
India	a,b		
New Zealand	b		
Vietnam	b		
Mexico	b		
Sweden	c		
Taiwan	c		
Japan	c		
Singapore	c		

^aCountries with the highest numbers of COVID-19 patients, ^bcountries that had implemented the world's stringent lockdown measures (maximum overall stringency index >80), ^ccountries who combatted the disease effectively without a stringent lockdown.

Table S2. Operational definitions of the variables used in principal component analysis [1]

Variable	Operational definition
Retail shops and recreation spots	Mobility trends for places such as restaurants, cafés, shopping centers, theme parks, museums, libraries and cinemas.
Groceries and pharmacy	Mobility trends for places such as supermarkets, food warehouses, farmers markets, specialty food shops and pharmacies.
Parks	Mobility trends for places like national parks, public beaches, marinas, dog parks, plazas and public gardens.
Transit stations	Mobility trends for places that are public transport hubs, such as underground, bus and train stations.
Workplace	Mobility trends for places of work.
Residential areas	Mobility trends for places of residence.

Table S3. Association between mobility and COVID-19 case doubling time: results from finite distributed lag models

Country	Coefficient	Estimate	95% CI	p-value
Brazil	Intercept	7.2	(6.4, 8.0)	<0.001
	Lag 2	-0.3	(-1.4, 0.7)	0.530
	Lag 3	-0.3	(-1.5, 1.0)	0.666
	Lag 4	0.2	(-1.0, 1.4)	0.735
	Lag 5	0.1	(-1.1, 1.3)	0.869
	Lag 6	-0.6	(-1.8, 0.6)	0.335
	Lag 7	0.3	(-0.9, 1.5)	0.583
	Lag 8	0.1	(-1.1, 1.3)	0.868
	Lag 9	0.0	(-1.2, 1.1)	0.956
	Lag 10	0.1	(-1.1, 1.3)	0.882
	Lag 11	0.0	(-1.2, 1.2)	0.993
	Lag 12	0.0	(-1.2, 1.2)	0.984
	Lag 13	0.1	(-1.0, 1.2)	0.876
	Lag 14	-1.3	(-2.3, -0.4)	0.009
Canada	Intercept	16.9	(13.7, 20.1)	<0.001
	Lag 2	3.3	(-2.9, 9.5)	0.294
	Lag 3	1.9	(-4.9, 8.8)	0.578
	Lag 4	-1.7	(-9.0, 5.6)	0.637
	Lag 5	-2.6	(-9.8, 4.7)	0.482
	Lag 6	-0.8	(-8.0, 6.4)	0.826
	Lag 7	2.4	(-4.8, 9.6)	0.502
	Lag 8	0.7	(-6.0, 7.3)	0.845
	Lag 9	-1.1	(-8.4, 6.3)	0.772
	Lag 10	2.8	(-4.6, 10.3)	0.448
	Lag 11	-2.1	(-9.7, 5.4)	0.571
	Lag 12	1.1	(-5.3, 7.5)	0.740
	Lag 13	-2.1	(-8.0, 3.7)	0.474
	Lag 14	-4.5	(-9.9, 0.9)	0.099
Germany	Intercept	67.9	(45.0, 90.8)	<0.001
	Lag 2	10.0	(-10.2, 30.1)	0.328
	Lag 3	-5.7	(-26.3, 14.9)	0.581
	Lag 4	-0.9	(-22.1, 20.2)	0.929
	Lag 5	-2.8	(-26.5, 20.8)	0.812
	Lag 6	6.6	(-17.0, 30.3)	0.577
	Lag 7	6.5	(-17.2, 30.3)	0.585
	Lag 8	9.1	(-14.7, 32.9)	0.447
	Lag 9	1.1	(-22.7, 24.9)	0.927
	Lag 10	0.7	(-23.3, 24.7)	0.953
	Lag 11	-9.1	(-33.1, 15.0)	0.455
	Lag 12	-4.1	(-25.4, 17.1)	0.700
	Lag 13	-17.7	(-38.3, 3.0)	0.092
	Lag 14	-4.9	(-25.3, 15.4)	0.629

Table S3. Continued

Country	Coefficient	Estimate	95% CI	p-value
India	Intercept	8.4	(6.7, 10.1)	<0.001
	Lag 2	-1.5	(-4.6, 1.5)	0.322
	Lag 3	0.8	(-2.8, 4.3)	0.665
	Lag 4	0.6	(-3.1, 4.2)	0.757
	Lag 5	3.1	(-0.6, 6.7)	0.103
	Lag 6	-2.1	(-5.8, 1.6)	0.262
	Lag 7	-2.6	(-6.2, 1.1)	0.171
	Lag 8	1.0	(-2.6, 4.7)	0.579
	Lag 9	-1.5	(-5.1, 2.2)	0.422
	Lag 10	1.0	(-2.6, 4.6)	0.587
	Lag 11	4.2	(0.6, 7.8)	0.024
	Lag 12	-10.9	(-14.5, -7.3)	<0.001
	Lag 13	4.9	(1.4, 8.4)	0.006
	Lag 14	2.0	(-0.9, 5.0)	0.178
Italy	Intercept	47.6	(37.2, 58.1)	<0.001
	Lag 2	0.8	(0.0, 4.3)	0.105
	Lag 3	0.0	(-1.6, 2.1)	0.881
	Lag 4	0.0	(-1.8, 1.9)	0.997
	Lag 5	0.0	(-1.5, 2.3)	0.832
	Lag 6	0.3	(-0.8, 3.3)	0.495
	Lag 7	0.0	(-1.7, 2.0)	0.951
	Lag 8	-0.2	(-3.0, 1.0)	0.604
	Lag 9	0.0	(-1.9, 1.8)	0.990
	Lag 10	0.0	(-2.6, 1.3)	0.732
	Lag 11	0.2	(-0.9, 3.3)	0.533
	Lag 12	0.0	(-2.5, 1.3)	0.756
	Lag 13	0.0	(-1.9, 1.7)	0.958
	Lag 14	-2.6	(-7.2, -0.2)	0.006
Japan	Intercept	63.0	(48.9, 77.1)	<0.001
	Lag 2	-0.3	(-12.9, 12.3)	0.961
	Lag 3	6.0	(-7.4, 19.4)	0.372
	Lag 4	6.1	(-7.7, 19.9)	0.381
	Lag 5	7.1	(-6.4, 20.6)	0.296
	Lag 6	9.7	(-3.8, 23.2)	0.155
	Lag 7	4.4	(-9.1, 17.9)	0.520
	Lag 8	-0.1	(-13.5, 13.4)	0.993
	Lag 9	-0.7	(-14.2, 12.9)	0.919
	Lag 10	-5.8	(-19.4, 7.9)	0.402
	Lag 11	1.1	(-12.5, 14.7)	0.870
	Lag 12	-26.3	(-39.9, -12.7)	0.000
	Lag 13	-11.3	(-24.5, 2.0)	0.094
	Lag 14	-16.4	(-30.3, -2.6)	0.021

Table S3. Continued

Country	Coefficient	Estimate	95% CI	p-value
Mexico	Intercept	7.9	(7.2, 8.5)	<0.001
	Lag 2	0.5	(-0.6, 1.6)	0.353
	Lag 3	0.4	(-0.9, 1.7)	0.555
	Lag 4	-0.8	(-2.1, 0.6)	0.249
	Lag 5	-0.2	(-1.5, 1.2)	0.807
	Lag 6	-0.6	(-1.9, 0.8)	0.408
	Lag 7	0.9	(-0.4, 2.2)	0.188
	Lag 8	-0.4	(-1.6, 0.8)	0.512
	Lag 9	0.0	(-1.3, 1.3)	0.965
	Lag 10	-0.4	(-1.7, 1.0)	0.579
	Lag 11	0.4	(-1.0, 1.7)	0.612
	Lag 12	-0.1	(-1.5, 1.2)	0.851
	Lag 13	0.1	(-1.3, 1.4)	0.921
	Lag 14	-1.3	(-2.4, -0.2)	0.026
New Zealand	Intercept	112.4	(78.3, 151.8)	<0.001
	Lag 2	2.9	(-1.9, 22.6)	0.274
	Lag 3	-0.2	(-19.2, 12.3)	0.825
	Lag 4	0.0	(-17.6, 14.9)	0.934
	Lag 5	-0.3	(-20.4, 12.2)	0.797
	Lag 6	0.0	(-17.6, 14.9)	0.936
	Lag 7	0.2	(-13.1, 19.9)	0.836
	Lag 8	2.6	(-6.0, 31.5)	0.436
	Lag 9	-0.1	(-19.2, 13.8)	0.871
	Lag 10	0.0	(-18.6, 14.6)	0.904
	Lag 11	-0.3	(-20.9, 13.3)	0.823
	Lag 12	-0.1	(-19.5, 14.7)	0.887
	Lag 13	-0.5	(-22.6, 11.0)	0.723
	Lag 14	-7.3	(-34.7, 0.2)	0.086
Singapore	Intercept	13.5	(12.3, 15.8)	<0.001
	Lag 2	1.2	(-1.1, 1.6)	0.131
	Lag 3	1.1	(-1.3, 1.6)	0.564
	Lag 4	-1.2	(-1.7, 1.1)	0.228
	Lag 5	1.1	(-1.3, 1.5)	0.650
	Lag 6	1.0	(-1.5, 1.4)	0.898
	Lag 7	1.2	(-1.2, 1.8)	0.250
	Lag 8	-1.1	(-1.5, 1.3)	0.675
	Lag 9	1.0	(-1.4, 1.5)	0.849
	Lag 10	-1.2	(-1.8, 1.2)	0.365
	Lag 11	1.1	(-1.3, 1.6)	0.506
	Lag 12	-1.1	(-1.6, 1.2)	0.437
	Lag 13	1.1	(-1.3, 1.6)	0.536
	Lag 14	-1.5	(-1.9, -1.1)	0.008

Table S3. Continued

Country	Coefficient	Estimate	95% CI	p-value
Spain	Intercept	20.1	(15.0, 26.0)	<0.001
	Lag 2	1.2	(-1.3, 1.9)	0.468
	Lag 3	-1.2	(-2.3, 1.5)	0.467
	Lag 4	1.1	(-1.6, 2.1)	0.669
	Lag 5	-1.1	(-2.1, 1.6)	0.721
	Lag 6	1.1	(-1.6, 2.1)	0.651
	Lag 7	1.1	(-1.6, 2.1)	0.653
	Lag 8	-1.3	(-2.4, 1.4)	0.414
	Lag 9	-1.3	(-2.4, 1.4)	0.381
	Lag 10	1.5	(-1.2, 2.9)	0.190
	Lag 11	-1.1	(-2.1, 1.8)	0.795
	Lag 12	1.1	(-1.6, 2.2)	0.650
	Lag 13	-1.2	(-2.3, 1.6)	0.539
	Lag 14	-1.6	(-2.8, -1.1)	0.029
Sweden	Intercept	18.0	(14.5, 21.6)	<0.001
	Lag 2	-1.0	(-4.0, 1.9)	0.487
	Lag 3	0.5	(-2.6, 3.5)	0.758
	Lag 4	-0.3	(-3.3, 2.8)	0.868
	Lag 5	0.2	(-3.2, 3.5)	0.919
	Lag 6	0.2	(-3.1, 3.5)	0.899
	Lag 7	1.0	(-2.4, 4.3)	0.566
	Lag 8	0.6	(-2.8, 4.0)	0.718
	Lag 9	0.0	(-3.3, 3.3)	1.000
	Lag 10	-1.9	(-5.2, 1.4)	0.258
	Lag 11	0.3	(-3.0, 3.7)	0.841
	Lag 12	-0.5	(-3.6, 2.6)	0.733
	Lag 13	-0.5	(-3.5, 2.5)	0.758
	Lag 14	-2.7	(-5.6, 0.3)	0.073
Taiwan	Intercept	47.0	(29.6, 64.4)	<0.001
	Lag 2	9.6	(-2.1, 21.3)	0.105
	Lag 3	2.0	(-10.6, 14.5)	0.756
	Lag 4	-0.2	(-12.7, 12.4)	0.981
	Lag 5	3.7	(-9.2, 16.5)	0.569
	Lag 6	0.4	(-12.4, 13.2)	0.947
	Lag 7	0.3	(-12.2, 12.7)	0.965
	Lag 8	7.0	(-5.2, 19.2)	0.258
	Lag 9	-0.8	(-13.3, 11.6)	0.893
	Lag 10	-0.5	(-13.2, 12.2)	0.938
	Lag 11	0.8	(-12.0, 13.6)	0.900
	Lag 12	-5.4	(-18.0, 7.2)	0.399
	Lag 13	3.3	(-9.3, 16.0)	0.602
	Lag 14	3.3	(-8.4, 15.0)	0.572

Table S3. Continued

Country	Coefficient	Estimate	95% CI	p-value
Turkey	Intercept	4.5	(3.3, 5.8)	<0.001
	Lag 2	0.1	(-1.2, 1.4)	0.846
	Lag 3	0.2	(-1.3, 1.6)	0.832
	Lag 4	0.7	(-0.8, 2.2)	0.376
	Lag 5	0.2	(-1.4, 1.7)	0.836
	Lag 6	0.6	(-1.0, 2.1)	0.464
	Lag 7	0.2	(-1.3, 1.7)	0.760
	Lag 8	0.3	(-1.1, 1.7)	0.677
	Lag 9	-0.5	(-2.1, 1.1)	0.537
	Lag 10	-0.5	(-2.1, 1.1)	0.499
	Lag 11	-0.2	(-1.8, 1.4)	0.796
	Lag 12	-0.4	(-2.1, 1.2)	0.600
	Lag 13	-0.3	(-1.9, 1.4)	0.753
	Lag 14	-1.3	(-2.8, 0.1)	0.070
United Kingdom	Intercept	18.0	(14.8, 21.2)	<0.001
	Lag 2	3.4	(-5.1, 11.8)	0.426
	Lag 3	0.9	(-10.1, 11.9)	0.868
	Lag 4	-2.0	(-13.0, 8.9)	0.715
	Lag 5	-3.7	(-14.3, 7.0)	0.494
	Lag 6	-0.5	(-11.1, 10.2)	0.931
	Lag 7	1.8	(-8.7, 12.3)	0.738
	Lag 8	-0.1	(-10.7, 10.6)	0.992
	Lag 9	1.3	(-9.3, 11.9)	0.803
	Lag 10	1.2	(-9.6, 12.1)	0.819
	Lag 11	-0.6	(-11.8, 10.5)	0.908
	Lag 12	1.2	(-10.4, 12.7)	0.841
	Lag 13	0.7	(-11.0, 12.4)	0.901
	Lag 14	-7.7	(-16.1, 0.7)	0.073
United States of America	Intercept	10.0	(8.4, 11.4)	<0.001
	Lag 2	1.1	(-1.2, 1.5)	0.467
	Lag 3	1.0	(-1.5, 1.4)	0.895
	Lag 4	-1.1	(-1.5, 1.4)	0.768
	Lag 5	-1.1	(-1.7, 1.3)	0.502
	Lag 6	1.0	(-1.4, 1.5)	0.921
	Lag 7	1.1	(-1.3, 1.6)	0.627
	Lag 8	1.1	(-1.3, 1.6)	0.504
	Lag 9	1.1	(-1.4, 1.6)	0.734
	Lag 10	1.1	(-1.4, 1.6)	0.696
	Lag 11	-1.1	(-1.6, 1.4)	0.669
	Lag 12	-1.1	(-1.7, 1.3)	0.573
	Lag 13	-1.1	(-1.7, 1.3)	0.531
	Lag 14	-1.3	(-1.9, 1.0)	0.062

Table S3. Continued

Country	Coefficient	Estimate	95% CI	p-value
Vietnam	Intercept	56.5	(47.4, 65.6)	<0.001
	Lag 2	2.2	(-16.0, 20.5)	0.807
	Lag 3	-18.7	(-46.6, 9.2)	0.186
	Lag 4	-3.3	(-32.4, 25.8)	0.824
	Lag 5	17.	(-12.0, 47.1)	0.240
	Lag 6	2.6	(-27.0, 32.3)	0.859
	Lag 7	4.6	(-24.4, 33.6)	0.753
	Lag 8	6.4	(-21.8, 34.7)	0.650
	Lag 9	-17.2	(-46.2, 11.8)	0.241
	Lag 10	0.4	(-29.4, 30.2)	0.981
	Lag 11	11.1	(-18.7, 41.0)	0.459
	Lag 12	-19.5	(-49.0, 10.0)	0.191
	Lag 13	-1.9	(-30.2, 26.4)	0.893
	Lag 14	-11.7	(-30.1, 6.6)	0.206

Significant lags ($p < 0.10$) are presented in bold font.