COIOS HEALTH

The CRUCIBLE
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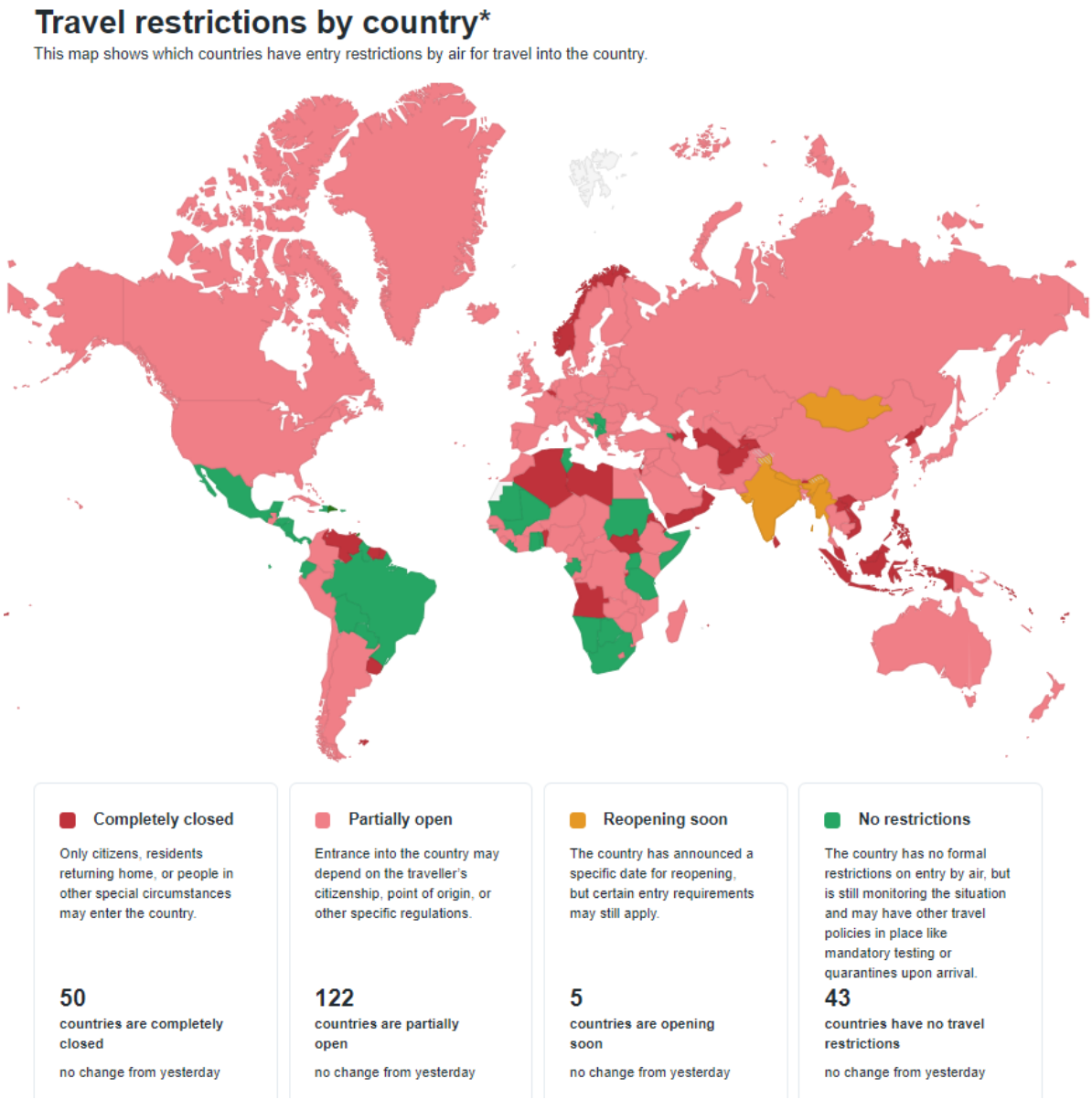
Contents

1. View from the virus

Risk of infection from air travel

The prospect of international travel is looming for UK nationals from 17 May, under a proposed traffic light system that determines what tests or quarantine will be required on return. The vast majority of other countries are either partially or fully closed to visitors, as set out in **Figure 1.1** from the travel company **Kayak (**more**)**. The UK is one of 42 countries (within the partially open category) that currently have mandatory quarantine requirements.

Figure 1.1 – Current travel restrictions around the world



Source: Kayak

The intent is that such restrictions will prevent or delay the spread of new variants, particularly given the possibility that such variants may be able to evade immune responses from vaccination and prior infection.

As always, it is important to quantify the risk, recognising that risks evaluated on past experience may not necessarily be a good guide to future risk. **Pang et al.** from **Boeing** (more) have carried out a systemic review and meta-analysis of publicly available literature to look specifically at the risk of SARS-CoV-2 transmission between passengers during air travel itself, rather than over the entire period of any visit.

The study looked for evidence of index and secondary COVID-19 cases related to travel between January and September 2020, where secondary cases were individuals travelling on a flight with an index passenger that were identified by contact tracing. Over this period, 2,866 index passengers were identified and only 50 confirmed secondary cases. The methodology of the study made specific adjustments to allow for asymptomatic cases (1.3x) and unreported cases (between 10x and 54x), and for transmission risk that most likely occurred before or after the flight.

The resulting estimate was that the risk of transmission during air travel itself was between 1 in 0.7 million and 1 in 8 million traveller-flights. Possible explanations advanced for this low risk included positioning of passengers (seat height, facing forward) and high-efficiency vertical air-filtration systems. Prolonged contacts after the flight in a variety of unventilated settings considerably increase the risk posed by infectious visitors, particularly with new variants in circulation.

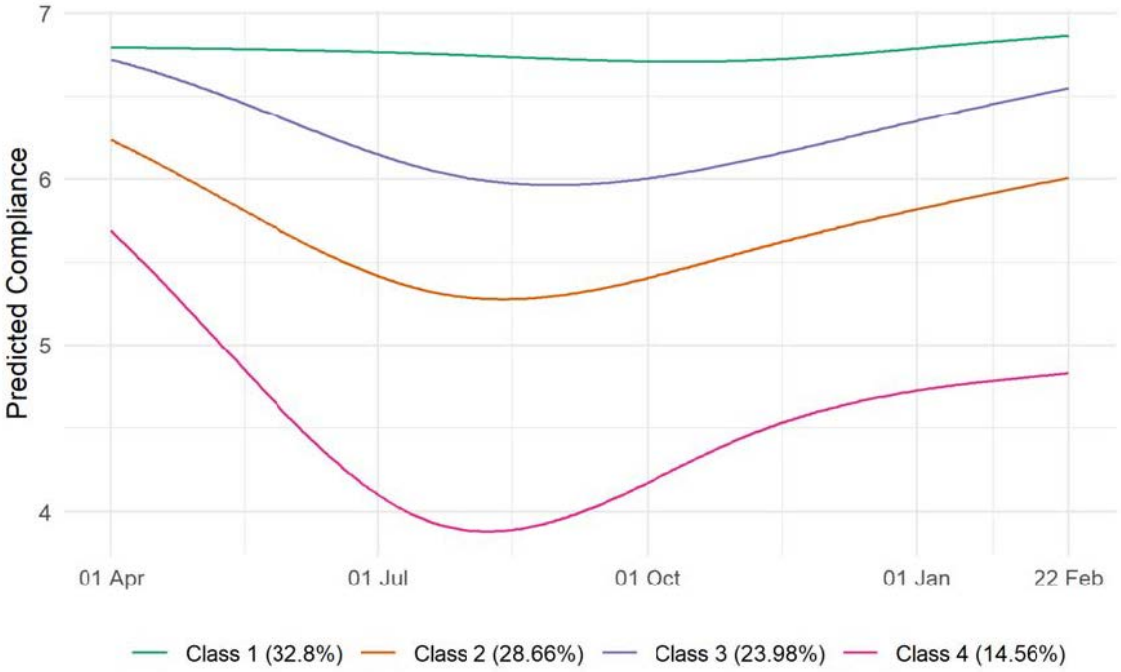
2. Behaviours during pandemic

Uncovering the evidence for behavioural fatigue

At the start of the pandemic, public health officials and policy makers were concerned about "behavioural fatigue" or the concept that prolonged periods of restrictions may lead to reduced compliance. This concern supported delays in the imposition of lockdowns and affected messaging over the likely extent and duration of future restrictions. However, there was insufficient prior evidence of the existence of "behavioural fatigue" as noted in an open letter in the **BMJ** from over 600 behavioural scientists (more), and considerable unease that this concept was being used to justify a high-risk public health policy.

In Crucible-29Mar (more) we introduced the **COVID-19 Social Study** that has been surveying adults on a range of different behaviours since the beginning of the pandemic. Last week, **Wright, Steptoe and Fancourt** released a further study (more) from 50,000 adults within this cohort that tracked self-reported compliance between 1 April 2020 and 22 February 2021. The study found that whilst most individuals had returned to comparable levels of compliance by the start of 2021, 1 in 7 were significantly less compliant during the 2nd wave as indicated in **Figure 2.1**.

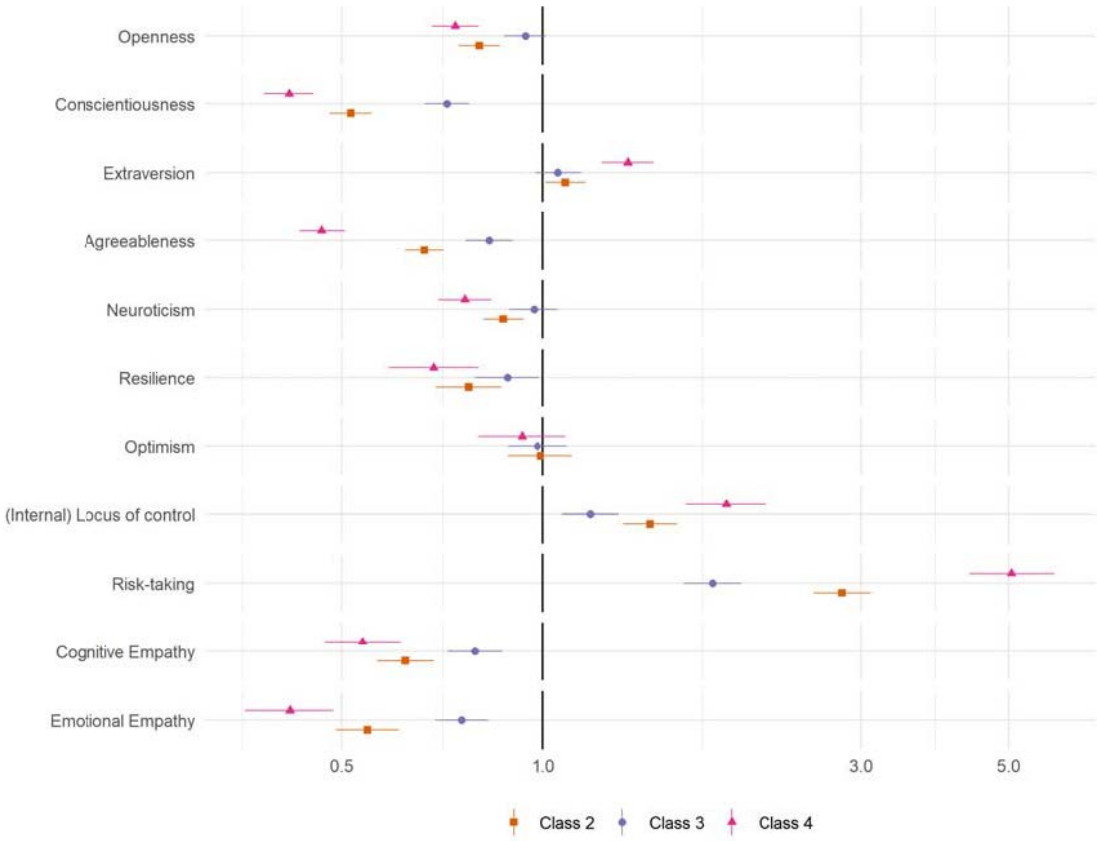
Figure 2.1 – Population compliance levels from COVID-19 Social Study



Source: Compliance trajectories from COVID-19 Social Study

Regression analysis identified particularly strong associations between belonging to class 4 and risk-taking behaviours, younger age, low emotional empathy and low conscientiousness. The study emphasised the importance of risk and personality traits as set out in **Figure 2.2** over material factors.

Figure 2.2 – Regression analysis of class membership based on personality traits (relative to class 1)



Source: Compliance trajectories from COVID-19 Social Study

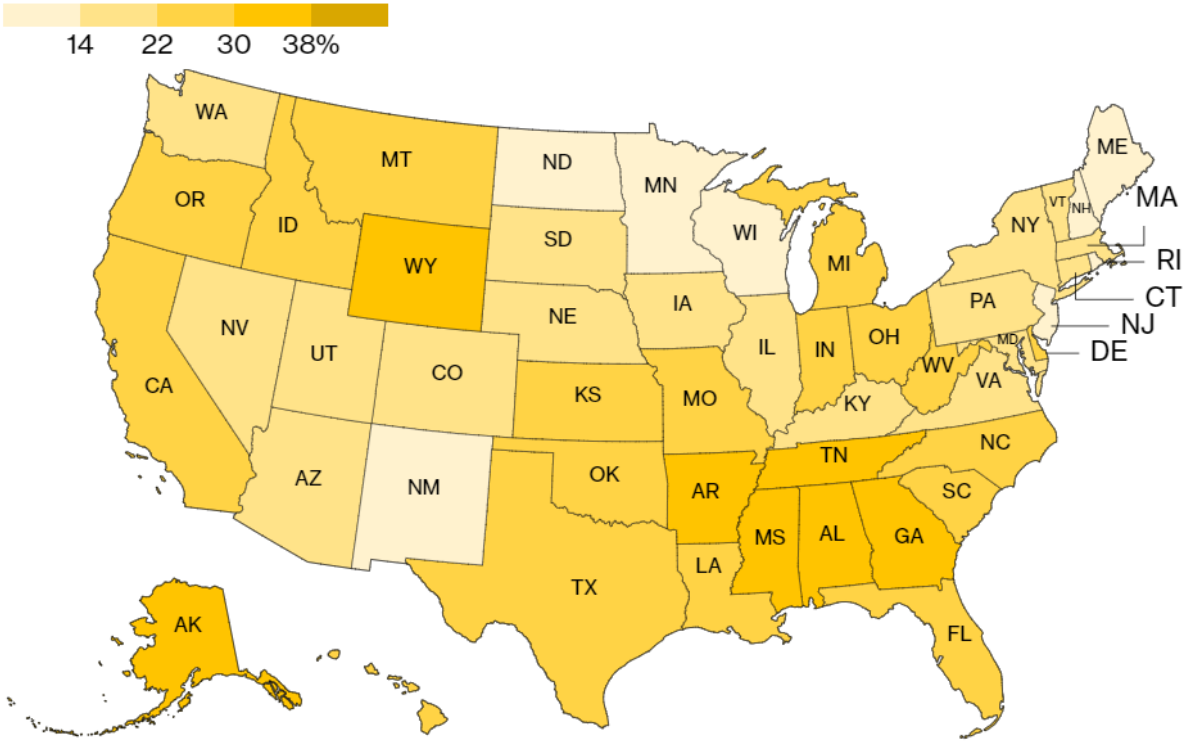
Further, it should be noted that the **COVID-19 Social Study** is based on a self-selecting group of volunteers, and as such the findings of the study are more likely to be underestimating the level of non-compliance in the general population.

Behavioural nudges and vaccinations

On 25 March, **President Biden** set a revised target of 200 million vaccines administered within the first 100 days of presidency (more). As of 16 April, this target was met with a total of 202.28 million doses administered, including 3.35 million on that day (more). This is an extraordinary logistical effort, mirroring that seen in many countries around the world, but it does hide a deeper concern in the drive towards better protection against the virus.

Analysis by **Bloomberg News** indicates that demand is slowing with surplus supplies building up. **Figure 2.3** sets out the proportion of vaccines delivered to different US states that have not yet been used.

Figure 2.3 – Percentage of vaccines doses delivered to individual US states but not used as at 12 April – compiled by Bloomberg News from data from Centers for Disease Control and Prevention



Source: Bloomberg News

All those over age 16 will be eligible for vaccination from April 19 (more), but this has been accelerated in a number of US states. The question is what steps can be taken to accelerate uptake. There are many factors in play that contribute to "vaccine hesitancy", but one study by **Dai et al**. (more) has examined the impact of behavioural "nudge" strategies on vaccination rates.

In a series of RCTs, the study used text messages to make vaccination salient and ease the process of scheduling appointments. The RCTs concluded that a first text message boosted appointment rates and vaccination rates by 86% and 26% respectively, whilst a second reminder text provided a further boost of 52% and 16% respectively. The overall impact of the interventions increased vaccination uptake by of the order of 3.5 percentage points for effectively zero marginal cost.

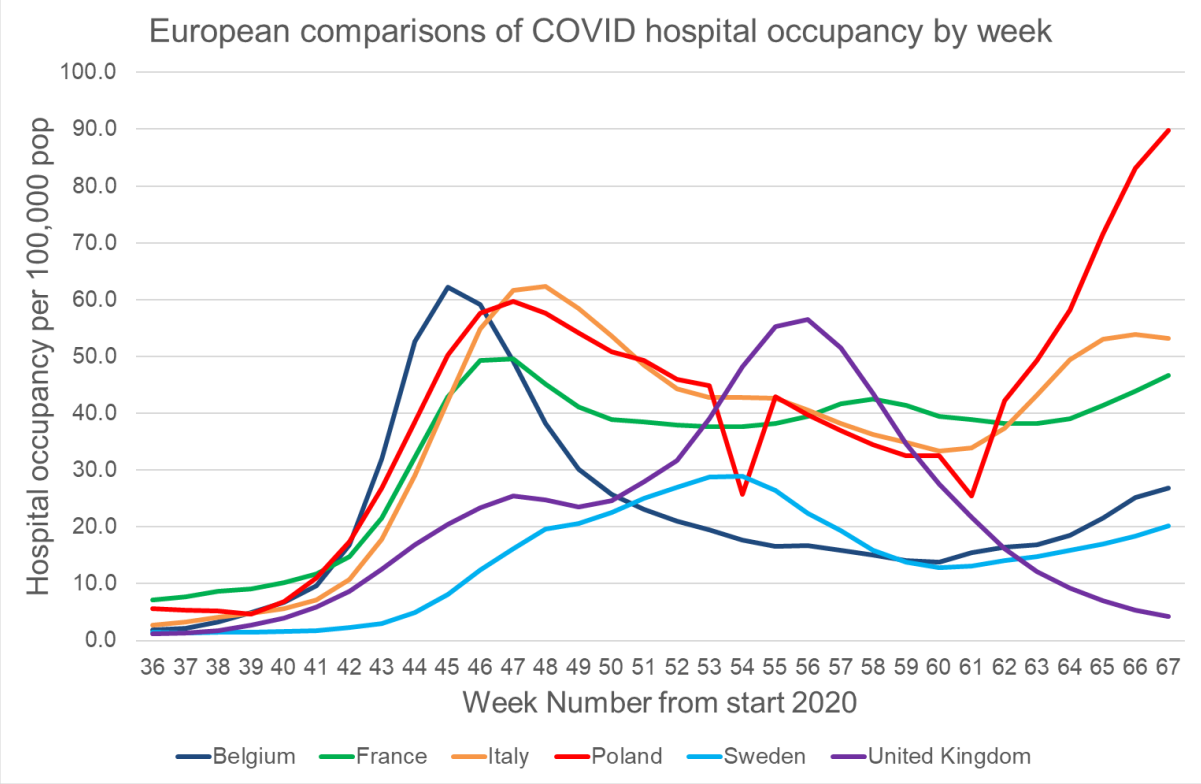
3. Healthcare today

Patterns of COVID hospitalisation across Europe

The **Gov.UK Coronavirus (COVID-19) dashboard** (more) provides a daily update on numbers of tests, confirmed cases, hospitalisations and deaths across the UK. This information includes the number of patients currently in hospital with COVID-19. The **European Centre for Disease Prevention and Control** (**ECDC**) provides equivalent information on daily hospital bed occupancy for most European countries (more).

The pattern of hospitalisation rates since week 36 in 2020 is set out in **Figure 3.1** for a select number of European countries, with more complete information set out in **Table 3.1** since the start of 2021 for all those European countries providing this data. Hospitalisation rates have more than doubled since the beginning of the year in Bulgaria, Hungary, Norway and Poland, whilst hospital occupancy has fallen to 9% and 14% of the levels at the start of the year for the UK and Portugal respectively.

Figure 3.1 – Daily hospital occupancy per 100,000 for select European countries since week 36, 2020



Source: ECDC & Gov.UK, analysis by COIOS Research

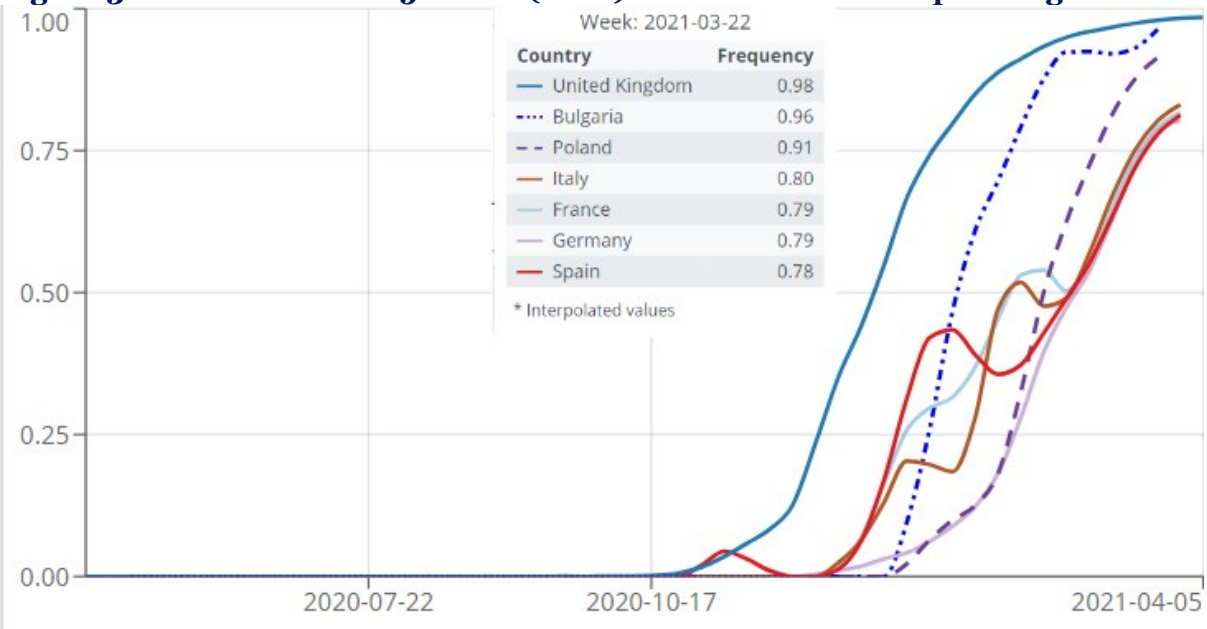
Table 3.1 – Daily hospital occupancy per 100,000 by week for those countries providing data to ECDC and the UK since start of 2021

Country	Week in 2021								Last week as % of Week 1 in 2021
	1	4	7	10	11	12	13	14	
Austria	21.92	16.39	11.64	14.12	16.08	18.15	19.21	19.91	91%
Belgium	17.66	15.91	13.84	16.82	18.52	21.55	25.20	26.79	152%
Bulgaria	62.23	41.06	52.01	91.41	112.53	131.14	144.90	149.83	241%
Croatia	55.18	33.03	20.74	19.76	22.08	26.54	33.78	42.69	77%
Czechia	67.16	55.47	59.59	82.93	83.02	76.39	66.26	57.26	85%
Denmark	15.35	10.73	4.74	3.85	3.36	3.54	3.72	3.83	25%
Estonia	30.78	32.31	37.95	50.87	52.49	53.14	53.14	47.26	154%
Finland	1.96	1.76	1.70	3.30	3.56	3.88	3.03	2.47	126%
France	37.68	41.64	39.52	38.22	39.06	41.45	43.96	46.67	124%
Hungary	55.99	38.30	41.85	87.62	105.46	121.44	124.15	118.96	212%
Iceland	3.35	1.34	1.30	0.33	0.21	0.04	0.13		4%
Ireland	21.32	33.79	16.19	7.46	7.04	6.65	5.67	4.66	22%
Italy	42.83	38.15	33.32	43.19	49.46	53.01	53.89	53.15	124%
Latvia	57.96	50.77	41.35	33.67	31.49	32.52	31.36	34.07	59%
Luxembourg	16.13	10.84	11.80	19.38	19.19	20.36	22.30	21.45	133%
Netherlands	11.78	9.52	8.07	7.91	8.45	9.21	9.60	10.03	85%
Norway	2.42	1.99	1.44	3.06	4.24	4.86	5.39	5.36	222%
Poland	25.71	36.94	32.58	49.37	58.22	71.63	83.14	89.81	349%
Portugal	33.39	64.34	38.42	11.19	8.31	6.78	5.39	4.82	14%
Slovakia	53.03	60.04	66.19	66.43	63.27	59.33	51.01	45.10	85%
Slovenia	56.64	53.34	30.68	22.52	22.24	24.04	25.01	28.50	50%
Spain	17.35	46.94	28.27	13.92	10.07	7.25			42%
Sweden	28.90	19.29	12.84	14.78	15.95	16.99	18.41	20.19	70%
UK	48.22	51.50	27.56	12.08	9.19	6.97	5.32	4.26	9%

Source: ECDC & Gov.UK, analysis by COIOS Research

The rapid increase in cases and hospitalisations across Europe has been ascribed to the spread of the **501Y.V1 (Kent)** variant, which has been associated with higher transmission and higher mortality rates. Analysis from **Covariant.org** (more) in **Figure 3.2** shows how the prevalence of this variant has increased in various European countries, following earlier patterns seen in the UK.

Figure 3.2 – Prevalence of 501Y.V1 (Kent) variant based on sequencing



Source: Covariant.org

4. Unlocking your data

Patient access to electronic health records

As of April 5, the **21st Century Cures Act** prevents electronic health record (eHR) providers from blocking information in the USA (more). Information blocking affects both healthcare professionals (**HCP**) and their patients, and can take a number of different forms:

- Restrictions and limitations on HCP's use and exchange of medical information
- Excessive fees to create eHR links to health IT systems
- Technical setups that block access, exchange or use of medical information

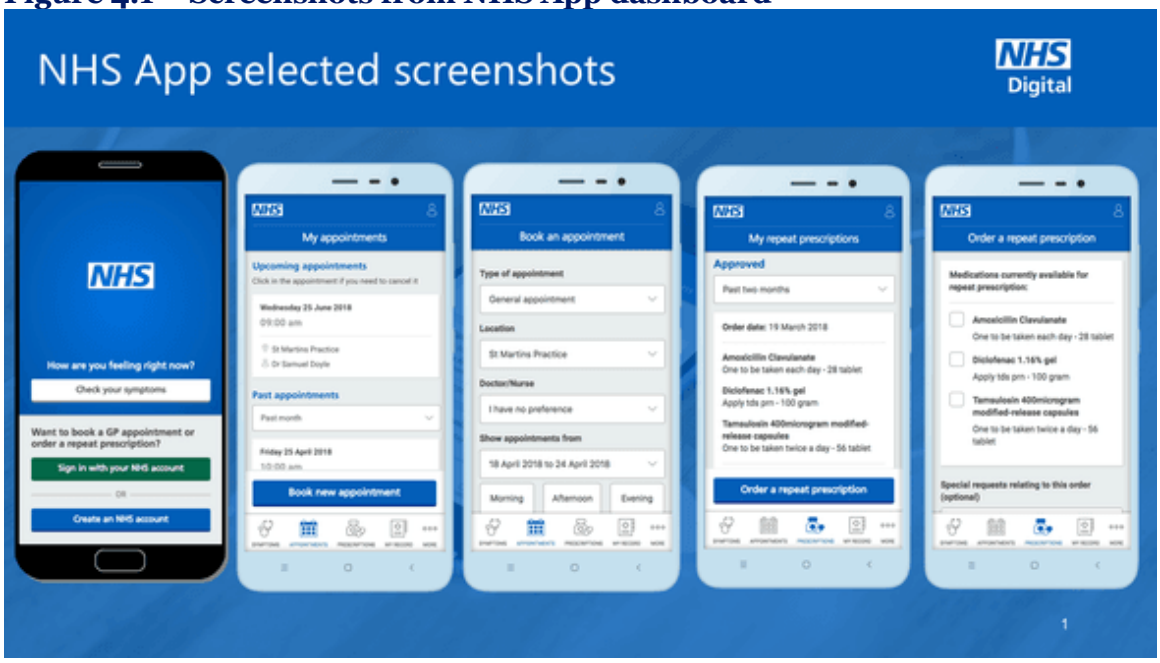
These changes will mean that patients are able to access their complete electronic health information at no cost.

Google is taking this opportunity to better understand how people interact with information extracted from their medical records (more). A pilot study of 300 Android users in 3 US states represents a renewed focus on medical records for Google after the prior launch and closure of Google Health in 2008-12.

In the UK, the **NHS App** (not to be confused with the **NHS COVID-19 App**) is providing patients with a range of different services through their smartphone such as the ability to book appointments, order repeat prescriptions and to view their Summary Care Record, all in a secure environment (more). GP surgeries may also provide more detailed access to enable patients to see details of individual consultations, diagnoses, lab tests and treatments. The **NHS App** was first rolled out across England in December 2018, and by January 2020 there were 200,000 registered users with the ability to sign in using touch/facial recognition.

NHSX, **NHS Digital** and **NHS England** have developed an NHS App dashboard. Anyone with an NHS email address is able to use the dashboard to see how many patients are currently using the **NHS App**, and what features they are using. This is intended to support decision making at multiple levels throughout the NHS.

Figure 4.1 – Screenshots from NHS App dashboard



Source: NHS App

5. Technology tomorrow

Impact of COVID on future research

Whilst the pandemic has thrust science into the centre stage, not all researchers have benefitted equally from the increased attention. Limitations in access to laboratory space, funding shortages and increased childcare demands have exacerbated gender inequalities and slowed progress in areas outside of health and epidemiology (more).

The **Department of Business, Energy and Industrial Strategy** (**BEIS**) commissioned a survey over the period up to October 2020 (more) of researchers' experiences during lockdown, receiving responses from 8,416 researchers across the UK. Key results included the following:

- 40% had reduced research capacity because of increased caring responsibilities
- 30% had reduced research capacity because of increased teaching commitments
- 45% expected a reduction in research funding over the next year, rising to 75% where funding was coming from industry
- >50% expected redundancies in their research groups
- Highest concern for employment opportunities for women, part-time researchers and those on fixed-term contracts.

A global survey of 22,000 researchers from 152 countries by open access publisher **Frontiers** (more) found that 47% believed that there would be less funding in their research area because of COVID-19, and 25% reported that funding had already been redirected from their research. Levels of concern were reportedly highest for those researchers in geology and environmental science.

Against this backdrop, **President Biden** announced a dramatic increase in non-defence R&D spending on 1 April with a $325 bn research, innovation and pandemic preparedness plan (more). This includes $50 bn for the **National Science Foundation**, $35 bn for energy and climate initiatives and $15 bn for climate change demonstration projects. The overall funding is part of the $2.3 tn **America Jobs Plan** focused on infrastructure investment, and there is likely to be significant resistance from Republican opponents and others concerned about the possibility of future increases in taxation. However, this announcement could shift the global dynamic on R&D funding commitments, as **Horizon Europe**, the EU's key funding programme for research and innovation, only has a budget of Euro 95.5 bn.

Horizon Europe is focused on climate change, achieving **UN Sustainable Development Goals** and enabling higher growth in the EU. The UK is expected to be taking part in **Horizon Europe** as an associated country after Brexit. However, there continues to be a lack of clarity over the UK's status in the programme as extra funding promised by the UK Government of £250 million this month is less than the £1 bn that **Universities UK** believed would be the cost of participation (more)