

The Unintended Consequences of COVID-19 Vaccine Policy: Why Mandates, Passports, and Segregated Lockdowns May Cause more Harm than Good

Bardosh, Kevin^{1,2*}, de Figueiredo, Alexandre³, Gur-Arie, Rachel^{4,5}, Jamrozik, Euzebiusz^{5,6}, Doidge, James^{7,8}, Lemmens, Trudo⁹, Keshavjee, Salmaan¹⁰, Graham, Janice¹¹, Baral, Stefan¹²

¹ School of Public Health, University of Washington, USA

² Division of Infection Medicine, Edinburgh Medical School, University of Edinburgh, UK

³ Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine UK

⁴ Berman Institute of Bioethics, Johns Hopkins University, Baltimore, MD, USA

⁵ Oxford-Johns Hopkins Global Infectious Disease Collaborative (GLIDE), Oxford, UK, and Baltimore, MD, USA

⁶ Ethox and Wellcome Centre for Ethics and Humanities, University of Oxford, UK

⁷ Intensive Care National Audit and Research Centre (ICNARC), London, UK

⁸ Department of Medical Statistics, London School of Hygiene and Tropical Medicine, London UK

⁹ Faculty of Law and Dalla Lana School of Public Health, University of Toronto, Canada

¹⁰ Department of Global Health and Social Medicine, Harvard Medical School, Boston, MA, USA

¹¹ Department of Pediatrics (Infectious Diseases), Dalhousie University, Canada

¹² Department of Epidemiology, Johns Hopkins School of Public Health, Baltimore, USA

*Corresponding author: kbardosh@uw.edu; bardosh_kevin@hotmail.com

Abstract

Vaccination policies have shifted dramatically during COVID-19 with the rapid emergence of population-wide vaccine mandates, domestic vaccine passports, and differential restrictions based on vaccination status. These policies have prompted ethical, scientific, practical, and political controversy; however, there has been limited evaluation of their potential unintended consequences. Here, we outline a comprehensive set of hypotheses for why these policies may be counter-productive and harmful. Our framework considers four domains: 1) behavioral psychology, 2) politics and law, 3) socioeconomics, and 4) the integrity of science and public health. While COVID-19 vaccines have had a profound impact on decreasing global morbidity and mortality burdens, we argue that current population-wide mandatory vaccine policies are scientifically questionable, ethically problematic, and misguided. Such policies may lead to detrimental long-term impacts on uptake of future public health measures, including COVID-19 vaccines themselves as well as routine immunizations. Restricting people's access to work, education, public transport, and social life based on COVID-19 vaccination status impinges on human rights, promotes stigma and social polarization, and adversely affects health and wellbeing. Mandating vaccination is one of the most powerful interventions in public health and should be used sparingly and carefully to uphold ethical norms and trust in scientific institutions. We argue that current COVID-19 vaccine policies should be reevaluated in light of negative consequences that may outweigh benefits. Leveraging empowering strategies based on trust and public consultation represent a more sustainable approach for protecting those at highest risk of COVID-19 morbidity and mortality and the health and wellbeing of the public.

1. Introduction

Since 2021, mandatory proof-of-vaccination policies have emerged from political and scientific sectors with the stated aim to combat COVID-19. These policies, initiated across the political spectrum including in many liberal democracies, have spread globally and have involved: workplace mandates (i.e. a ‘no jab, no job’ US federal mandate); green passes/vaccine passports that limit access to social life or travel (e.g., Israel, Australia, Canada, New Zealand, and most European countries); school-based mandates (e.g., most North American universities); differential lockdowns for the unvaccinated (e.g. Austria and Australia); the use of vaccine metrics in lifting lockdowns and other restrictions (e.g., Australia and New Zealand); differential access to medical insurance and healthcare (e.g., Singapore) or additional health tax (e.g. Quebec, Canada); and mandatory population-wide vaccination with taxes, fines, and imprisonment for the unvaccinated (e.g., The Philippines, Austria, Greece) (see **Table 1**)

Table 1: The global turn towards mandatory COVID-19 proof-of-vaccination policies*

Policy / intervention	Countries
“No jab, no job” mandates (e.g. Government employees, key workers, public and private sector)	Australia, Canada, China, Costa Rica, Croatia, Czech Republic, Denmark, Egypt, Fiji, France, Ghana, Hungary, Italy, Kazakhstan, Latvia, Lebanon, New Zealand, Oman, Poland, Philippines, Russia, Saudi Arabia, Tunisia, Turkey, Ukraine, United States.
Healthcare worker mandates	Australia, Britain, Croatia, Czech Republic, England, Finland, France, Germany, Greece, Hungary, Lebanon, New Zealand, Poland, United States (some states)
Internal vaccine passports to attend social events, restaurants, bars, nightclubs, fitness facilities, entertainment venues and for bus/train/airport travel	Australia, Austria, Britain, Bulgaria, Canada, Czech Republic, Denmark, Egypt, France, Germany, Italy, Israel, Kenya, Lebanon, Morocco, Netherlands, Romania, Serbia, Singapore, Switzerland, South Korea, Ukraine, United States (some states)
School-based mandates	Costa Rica, Lithuania and United States (some states)
Full country mandatory vaccination	Austria, Ecuador, Germany, Indonesia, Micronesia, Turkmenistan, Tajikistan.
Full population mandate for the elderly	Czech Republic, Greece, Malaysia, Russia

*This is not a comprehensive list of policies, which are rapidly changing in early 2022. This list excludes the use of segregated lockdowns of the unvaccinated (e.g. Austria, Germany, Australia), entry requirements for international travel, fines and penalties (including restricted access to social services and medical care, business capacity restrictions and threats of imprisonment) and the use of vaccine metrics to inform other restrictions. There is a significant variation in how countries recognize infection-derived immunity, allow religious, philosophical and/or medical exemptions and incorporate testing as an alternative to vaccination. In addition, some countries have implemented a combination of policies and interventions, so each is not mutually exclusive. Adapted from <https://www.reuters.com/business/healthcare-pharmaceuticals/countries-making-covid-19-vaccines-mandatory-2021-08-16/> (accessed 30 December 2021).

The publicly communicated rationale for implementing such policies has shifted over time. Early messaging around COVID-19 vaccination as a public health response measure focused on protecting the vulnerable. This messaging shifted to reaching vaccination thresholds (of two-doses) to “end the pandemic” and “get back to normal” (DeRoo et al. 2020; Rosenbaum, 2021; Viana et al. 2021), which has in turn pivoted to a universal vaccination recommendation to reduce hospital/ICU burden (to address the so-called “pandemic of the unvaccinated”), which often includes vaccinating young children (5 to 11 year-olds), those with prior infection, and a third adult ‘booster’ dose in a growing number of settings (DW, 2021).

The scientific rationale for current blanket vaccine policies, as well as their ethical and legal justification based on the principle of proportionality (King et al. 2022), is increasingly questionable given recent data (McIntyre et al. 2022). COVID-19 vaccines have been a life-saving intervention for millions of people and continue to provide excellent protection against severe disease (Bajema et al. 2022; Leon et al. 2022; UKHSA, 2022; ONS 2021b). A growing body of evidence, however, shows significant waning effectiveness against infection (and transmission) at 12 to 16 weeks, with both Delta and Omicron variants (Chemaitelly, et. al., 2021; Eyre et al. 2022; Franco-Paredes, 2022; Goldberg, et. al, 2021; Kissler, et. al., 2021; Levin, et. al., 2021; Singanayagam et al. 2022) – waning that may even reach 0% effectiveness with the Oxford-AstraZeneca vaccine after this time (Nordström et. al., 2021; ONS, 2021a). Vaccine effectiveness may also be lower in younger age groups, who are targets of most vaccine passport or mandate policies (Powell, 2021) and there seems to be little quantitative evidence of the threat the unvaccinated pose to high-risk individuals (Prosser et al. 2021b), especially in settings that have already obtained high levels of vaccine uptake and prior infection (Kojima and Klausner, 2022). While higher rates of hospitalization and COVID-19 associated morbidity and mortality can indeed be observed among the unvaccinated across all age groups (Bajema et al. 2021; Leon et al. 2022, UKHSA, 2022; ONS 2021b), broad-stroke passport and mandate policies do not seem to recognize the extreme risk differential across populations and, in many countries, ignore the protective role of prior infection (Block, 2021; Kojima and Klausner, 2022; McIntyre et al. 2022).

COVID-19 vaccination policies have been met with increasing degrees of public, community, and political resistance, including energetic mass street protests and popular movements around the world (Paterlini 2021; Ward et. al., 2022). Most media and civil debate in liberal democracies has framed this reaction as a consequence of “anti-science” and “right-wing” forces, emphasizing the need to fight online misinformation spread by the anti-vaccination movement (Hotez, 2021). While many commentators have pointed out that vaccine mandates for other diseases exist in some settings (e.g. schools and, in some instances, for healthcare workers) (Omer et al. 2019), this stance often ignores the unique context of the current pandemic: *what* – the unique policy milieu (previous lockdowns, restrictions, fear, distrust, risk

perceptions, protection from prior infection); *who* – characterization of groups that can most benefit from vaccines (socio-demographic characteristics); and *why* – including socio-economic, cultural, historic, governance and political structural dynamics that shape medical mistrust and vaccine refusal. While vaccine policies have largely been framed as offering ‘benefits’ with freedoms for those who take up a full COVID-19 vaccination series (NSW Government 2021; Guardian 2021), they include elements that are punitive, discriminatory and coercive, including conditioning access to health, work, travel and social life on vaccination status in many settings.

Potential unintended consequences of COVID-19 vaccine policies

Behavioural psychology	Political and legal effects	Socio-economics	Integrity of science and public health
<ul style="list-style-type: none"> • Reactance and entrenchment • Cognitive dissonance • Stigma and scapegoating • Conspiracy theories and distrust 	<ul style="list-style-type: none"> • Erosion of civil liberties • Polarization and the anti-vax movement • Disunity in global health governance 	<ul style="list-style-type: none"> • Disparity and inequality • Reduced health system capacity • Exclusion from work and social life 	<ul style="list-style-type: none"> • Erosion of informed consent • Erosion of trust in public health policy • Erosion of trust in regulatory oversight

Figure 1: Conceptual framework. We consider a broad conceptual framework spanning core aspects of behavioral psychology, politics and the law, the socio-demographic drivers of health inequality, and the integrity of science and public health.

In this paper, we reflect on current COVID-19 vaccine policies and outline a comprehensive set of hypotheses for why they may have far-reaching unintended consequences that may prove to be both counterproductive and damaging to public health, especially within some socio-demographic groups. Our framework considers four domains: 1) behavioral psychology, 2) politics and law, 3) socioeconomics, and 4) the integrity of science and public health (see **Figure 1**). We argue for the need to reframe the boundaries of the problem by considering the unintended consequences of these policies on public perceptions, resistance, vaccine confidence, and social wellbeing, as well as more clearly stating the scientific rationale and justification, as well as their intended public health benefit. We believe mandatory policies centering on COVID-19 vaccination status should be urgently reconsidered, taking into account non-discriminatory, trust-based public health policy rooted in equity, social justice and bioethics.

2. What can we learn from the behavioral sciences?

2.1. *Reactance, entrenchment and vaccine uptake*

Many COVID-19 vaccination-status policies are intended to drive vaccine uptake, either through framing vaccination as something that will bring about benefits (international travel, domestic travel access to social events) or by making life sufficiently difficult for the unvaccinated.

Apart from mandatory vaccination of the elderly (currently planned in Czech Republic, Greece, Malaysia, and Russia), most policies do not specify individuals at higher-risk of severe COVID-19 outcomes (Biswas et al., 2021; Palaidimos et al., 2020) – among whom COVID-19 vaccine uptake rates, and vaccine confidence more generally, is very high (de Figueiredo et al., 2021b; Ritchie et al. 2020).

Although recent studies have suggested that current vaccine policies are likely to increase population-level vaccination rates to some degree (Albarracin et al., 2021a; Karaivanov et al., 2021; Mills and Ruttenauer, 2022; Prosser and Streiner, 2021a), gains were largest in people under 30 years old (a very low-risk group) and in countries where uptake was below average (Mills and Ruttenauer, 2022). Moreover, insights from behavioral psychology suggest that these policies are likely to entrench distrust and provoke *reactance* - a motivation to counter an unreasonable threat to one's freedom. Literature reviewed by Drury et al. (2021), including a specific survey study by Porat et al. (2021) in the UK and Israel, found that COVID-19 compulsory vaccination would likely increase levels of anger, especially in those who are already mistrustful of authorities, and do little to persuade the already reluctant. Two experiments in Germany and the USA found that a new COVID-19 vaccine mandate would likely energize anti-vaccination activism, reduce compliance with other public health measures, and decrease acceptance to future voluntary influenza or varicella (chickenpox) vaccines (Sprengholz et al. 2021a, 2021b). A third experiment found that selective mandates increased reactance when herd immunity targets were not clearly explained (Sprengholz and Betsch, 2020) – which most governments have failed to communicate. de Figueiredo et al. (2021b) found that vaccine passports in the UK would induce a net *decrease* in inclination to vaccinate among those who had not received a full vaccination dose, while Bell et al. (2021) found that UK healthcare workers who felt pressured to vaccinate were more likely to have declined the COVID 19 vaccine. Finally, Jorgensen et al. (2021) found that the reintroduction of vaccine passports in late 2021 in Denmark increased distrust among the unvaccinated, while recent evidence from France suggests that while the *passe sanitaire* increased levels of vaccination, it did so to a lower extent among the most vulnerable, may have contributed to increased nocebo effects, and did not reduce vaccine hesitancy itself: the authors concluded that “Mandatory vaccination for COVID-19 runs the risk of politicizing vaccination further and reinforcing distrust of vaccines” (Ward et al., 2022).

2.2. Cognitive dissonance

The public interpretation of COVID-19 vaccination status policies has occurred within the context of the rapidly changing pandemic. Oversimplified public announcements, downplaying uncertainties and potential adverse events, and misleading information communicated from health authorities regarding vaccine efficacy and disease risk, have helped facilitate various layers of *cognitive dissonance* (a psychological stress precipitated by the perception of contradictory information) (see **Table 2**). Mandates, passports, and segregated restrictions create an environment where reactance effects are exaggerated because people with low vaccine confidence see the contradictory information as validating their suspicions and concerns. Citing the potential for backlash and resistance, in December 2020, the director of the World Health Organization's (WHO) immunization department stated: "I don't think we envision any countries creating a mandate for [COVID-19] vaccination" (Reuters, 2020). Many governments originally followed with similar public statements, only to shift positions in mid-2021.

Table 2: Incomplete or misleading information by health authorities and the media

Vaccine efficacy	Communications have sometimes over-emphasized the efficacy of COVID-19 vaccines, both for preventing infection and transmission, and in preventing severe disease (e.g., Christie, 2022; Guardian 2021c; New York Times, 2021; Nordstrom et. al, 2021; ONS 2021a; VCP 2021a, b; Wong, 2021).
Vaccine incentives	Communications from official sources have often associated vaccination with freedom from restrictions and lockdowns (e.g., NSW Government 2021; Guardian 2021).
Risk	The media have often downplayed the age- and comorbidity-based risk of COVID-19 while promoting population-wide vaccination across all age-groups (National Public Radio, 2021; Guardian, 2021b; Wexler Medical Center; 2021). As vaccination programs have moved down the age spectrum, the media has followed suit by over-emphasizing the risks of COVID-19 for young adults and then children in turn (Broadfoot, 2022; Bekirmpis, 2022, Project Halo 2021a).
Vaccine safety	Limited pharmacovigilance and data sharing in some settings, including the original clinical trials (Doshi et al. 2022; Tanveer et al., 2021). Early evidence of blood clotting complications were reported as "one in a million" events (BBC News 2021b; The Daily Mail 2021), but ultimately proved much higher (Hippisley Cox et. al., 2021). More recent safety signals associated with myocarditis in young men (Mevoach et. al, 2021) and with the Moderna vaccine in particular (Patrone, et. al., 2021) have been downplayed and risks may not have been fully considered in the context of protection afforded by prior infection. Reports often state that the risk of myocarditis is greater from infection than vaccination, without fully disclosing age- or sex-stratified risk in a detailed fashion (Patone et. al., 2021; Pyle & Huang, 2022).
Vaccine coverage	Vaccination coverage is regularly reported on without breaking down coverage by age or risk group. By including children, and other low-risk groups, coverage for those at most risk is deflated (Bradley et al, 2021). The addition of boosters to vaccination programs leads to moving goalposts, whereby coverage rates can be regularly revised down.

Acquired immunity	The media and several governments have downplayed the importance of acquired immunity. Often the media has framed vaccination as the safest and only route to protection (see, e.g., ZOE, 2021 ; NBC News, 2021; Forbes, 2021; New York Times, 2021b), but this lacks context for those with prior infection, who may have a higher risk of vaccine side effect (Gavi, 2021; ZOE, 2021b; Krammer et al, 2021) and vaccine-specific risks in particular demographics (Patrone, et. al., 2021), as well as a lack of detailed age- and sex-stratified risk-benefit communication in light of the reduced severity of the Omicron variant.
-------------------	---

Cognitive dissonance may have been compounded by the changing rationale provided for vaccine policies and public perceptions that certain information is being actively censored or selectively presented (Coombes and Davies, 2022; New York Times, 2021a). In many countries, “green-passes” have been implemented without clear communication, justification, and transparency, and with ambiguities and public concerns (Luster et al. 2021). Initial communication that COVID-19 vaccines would prevent transmission to vaccinated people contributed to skepticism and confusion once onerous non-pharmaceutical interventions (NPIs) were reintroduced in countries with vaccine mandates or passports in late 2021 (BBC News, 2021a; Wong, 2021).

Significant public concerns about safety signals and pharmacovigilance have been furthered by the lack of full transparency in COVID-19 clinical trial data (Doshi et al. 2022; Tanveer et al., 2021) as well as shifting data on adverse effects, such as blood-clotting events (UK Government, 2021), myocarditis in young men (Munro, 2021), and menstrual periods (Male, 2021). These shifts have been associated with changes to vaccination guidelines in terms of eligibility for different vaccines. Most employer-based vaccine mandates and passports in North America have disregarded the evidence that infection-derived immunity also provides significant protection from severe disease (Kojima and Klausner, 2022), and that vaccination itself does not stop transmission in a significant number of people, leading to thousands of protected individuals being fired from their jobs (or choosing to leave) while transmission has continued among vaccinated individuals in the workplace.

2.3. Stigma as a public health strategy

Public and political discourse quickly normalized stigma against people who remain unvaccinated, often woven into the tone and framing of media articles: for example, a popular news outlet compiled a list of “notable anti-vaxxers who have died from COVID-19” (Savulescu and Giubilini, 2021). Political leaders have singled out the unvaccinated, blaming them for: the continuation of the pandemic; stress on hospital capacity; the emergence of new variants; driving transmission to vaccinated individuals; and the necessity of ongoing lockdowns, masks, school closures and other restrictive measures (see **Table 3**). Political rhetoric has descended into moralizing, scapegoating, blaming, and condescending language

using pejorative terms and actively promoting stigma and discrimination as tools to increase vaccination. This has become socially acceptable among many vaccinated individuals and pro-vaccine groups as well as the public at large. The effect is to further polarize society – physically and psychologically – with limited discussion as to the reasons why people may remain unvaccinated and specific strategies to increase uptake especially in communities where there would be disproportionately larger individual and societal benefits (e.g., reducing ICU admissions). Importantly, there is rarely a discussion of *who* and *why* people remain unvaccinated as compared to just presenting a proportion. Characterizing determinants of uptake may provide insight into the relative impact of disinformation vs historical disenfranchisement and structural racism. Increasingly, vaccine policy appears to have driven social attitudes towards an in/out group dynamic rather than adaptive strategies for different communities and risk groups.

Table 3: Political rhetoric regarding the unvaccinated

Country leader	Statement
Emmanuel Macron, PM of France	<p>“[It is] only a very small minority who are resisting. How do we reduce that minority? We reduce it by pissing them off even more...When my freedoms threaten those of others, I become someone irresponsible. Someone irresponsible is not a citizen.”</p> <p>https://www.theguardian.com/world/2022/jun/04/macron-declares-his-covid-strategy-is-to-piss-off-the-unvaccinated</p>
Justin Trudeau, PM of Canada	<p>“When people are seeing cancer treatment and elective surgeries put off because beds are filled with people who chose not to get vaccinated, they’re frustrated...When people see that we are in lockdowns or serious public health restrictions right now because of the risk posed to all of us by unvaccinated people, people get angry.”</p> <p>“They are extremists who don’t believe in science, they’re often misogynists, also often racists...It’s a small group that must be in, and we have to make a choice, as a leader and as a country: Do we tolerate these people?”</p> <p>https://torontosun.com/opinion/columnists/warmington-opposition-shockingly-silent-on-pms-hatred-of-unvaccinated-canadians</p>
Joe Biden, President of the United States of America	<p>“This is a pandemic of the unvaccinated. And it’s caused by the fact that despite America having an unprecedented and successful vaccination program, despite the fact that for almost five months free vaccines have been available in 80,000 different locations, we still have nearly 80 million Americans who have failed to get the shot.”</p> <p>https://www.whitehouse.gov/briefing-room/speeches-remarks/2021/09/09/remarks-by-president-biden-on-fighting-the-covid-19-pandemic-3/</p> <p>"For the unvaccinated, you're looking at a winter of severe illness and death for yourselves, your families, and the hospitals you may soon overwhelm."</p> <p>https://www.whitehouse.gov/briefing-room/press-briefings/2021/12/17/press-briefing-by-white-house-covid-19-response-team-and-public-health-officials-74/</p>

Naftali Bennett, PM of Israel	<p>“Dear citizens, those who refuse vaccines are endangering their health, those around them and the freedom of every Israeli citizen. They are endangering our freedom to work, the freedom of our children to learn and the freedom to hold celebrations with the family. Those who refuse vaccines hurt us all because if all of us were vaccinated, we would all be able to maintain daily life. But if one million Israelis continue to not get vaccinated, this will oblige the eight million the rest shut themselves in their homes.” https://www.gov.il/en/departments/news/event_statement220721</p>
Michael Gunner, Northern Territories Chief Minister, Australia	<p>"If you are anti-mandate, you are absolutely anti-vax, I don't care what your personal vaccination status is. If you support, champion, give a green light, give comfort to or] support anybody who argues against the vaccine, you are an anti-vaxxer, absolutely. Your personal vaccination status is not relevant. If you campaign against the mandate...If you say 'pro-persuasion', stuff it, shove it. You are anti-vax.” https://www.abc.net.au/news/2021-11-22/nt-covid-vaccine-mandate-opponents-anti-vaxxers-michael-gunner/100640656</p>
Jacinda Ardern, PM of New Zealand,	<p>"If you are still unvaccinated, not only will you be more at risk of catching COVID-19, but many of the freedoms others enjoy will be out of reach... we have managed very high vaccination rates, generally, without the use of certificates but what has become clear to me is that they are not only a tool to drive up vaccines; they are a tool for confidence. People who are vaccinated will want to know that they are around other vaccinated people – it is a tool for business" https://www.spectator.co.uk/article/saint-jacinda-acks-a-two-tier-society</p>
Tony Blair, former UK Prime Minister	<p>“We need to target the unvaccinated. Frankly if you are unvaccinated at the moment and you’re eligible and have no health reason for being unvaccinated, you’re not only irresponsible but you’re an idiot. I am sorry but truthfully you are. With this Omicron variant...you will get it and this will put a lot of strain on the health service.” https://www.thetimes.co.uk/article/tony-blair-if-youre-eligible-and-refuse-the-covid-vaccine-youre-an-idiot-sz97xhkdg</p>
Rodrigo Duterte, President of The Philippines	<p>“I’m now giving orders to village leaders to look for those persons who are not vaccinated and request them to stay put [in their house]...If they refuse to vaccinate, or continue to leave their home, the village leaders are empowered to arrest them....” https://healthpolicy-watch.news/philippine-president-arrest-unvaccinated/</p>

Leveraging stigma as a public health strategy, regardless of whether or not individuals are opposed to vaccines, is likely to be practically ineffective at promoting vaccine uptake (Kampf, 2021). Unvaccinated or partially vaccinated individuals often have concerns that are based in some form of evidence (e.g. prior COVID-19 infection, data on age-based risk, historic/current trust issues with public health and governments, including structural racism), personal experiences (e.g. direct or indirect experience of adverse drug reactions or iatrogenic injuries, unrelated trauma, issues with access to care to address adverse events, etc.) and concerns about the democratic process (e.g., belief that governments have

abused their power by invoking a constant state of emergency, ignoring processes of public consultation, and over-relying on pharmaceutical company-produced data in their decision-making) that may prevent or delay them from choosing to vaccinate. Current inflammatory rhetoric runs against the pre-pandemic societal consensus that health behaviors (including those linked to known risk factors for severe COVID-19, e.g., smoking and obesity (Palaiodimos et al., 2020)) should not impact the way medical, cultural, or legal institutions treat an individual seeking care. Certain governments are now imposing medical insurance fines or premiums on the unvaccinated, while medical staff and hospital administrators are considering using vaccination status as a triage protocol criterion. The American Medical Association released a statement decrying the refusal to treat unvaccinated patients (American Medical Association, 2021) but this has not prevented the ongoing narrative of shaming and scapegoating people who have chosen not to vaccinate.

2.4. Conspiracy theories and distrust

Trust is one of the most important predictors of vaccine acceptance globally (Larson et al., 2018) including confidence in COVID-19 vaccines (Lazarus, 2021; de Figueiredo et al., 2021b; Cook et al., 2022). Data show the importance of being transparent about negative vaccine information to increase trust; for example, Petersen et al. (2021) recently found that when health authorities are not transparent, it can increase receptivity to alternate explanations.

COVID-19 vaccines have grafted onto multiple social perceptions, logics and anxieties about science, technology and corporate and government power, and “conspiracy theories” have become widely circulated, especially among unvaccinated people (Hotez et al. 2021). Forcefully implemented vaccine policies may entrench existing beliefs of distrust by creating a strong confirmation bias that governments and corporate powers are acting in an authoritarian manner. Some of the major concerns include adoption of implantable tracking devices (including micro-chips), digital IDs, the rise of social credit systems, and the establishment of authoritarian biosurveillance governments. Paradoxically, the COVID-19 pandemic happens to coincide with far-reaching technological advances that do provide the capability for new and future forms of mass state surveillance (UK Parliament 2021; Ram and Gray, 2020). For example, biocompatible intradermal devices have recently been created that can be used to hold vaccine records, while multifunction implantable microchips (that can regulate building access and financial payments, much like cell phone) are now available on the market (McHugh et al. 2019; Teh, 2021). Aspects of vaccine passport policies combined with these innovations – as well as censorship by social media companies of vaccine trial issues from reputable sources like the BMJ (Coombes and Davies, 2022) – may reinforce and exacerbate suspicion and distrust (The Royal Society, 2022).

3. The political and legal effects of vaccine mandates, passports, and differential restrictions

3.1. The erosion of civil liberties

COVID-19 vaccine policies represent a broad interference with the rights of unvaccinated people. While some governments have recently passed mandates and passports through the democratic process (e.g., Switzerland, Austria, France), many current policies are *regulations* or *decrees*, created under states of emergency that have suspended normal democratic governance (National Academic for State Health Policy, 2021). Many current policies have been implemented in ways that allow ad hoc juridical decisions and irregular and over-permissive private-sector rules, with limited accountability or legal recourse to address rights violations (Luster et al. 2021).

Vaccine passports risk enshrining discrimination based on *perceived* health status into law, undermining many rights of healthy individuals: indeed, unvaccinated but previously infected people will generally be at substantially *less* risk of infection (and severe outcomes) than doubly vaccinated but infection-naïve individuals (Gazit et. al. 2021). A weekly negative PCR test is often seen as a compromise made to the unvaccinated in lieu of full vaccination status, but this places additional burdens (including financial) on the unvaccinated. Employer-imposed mandates that require people to be vaccinated following prior infection, especially where employees can work remotely, appears to lack the basic elements of a Bona Fide Occupational Requirement (BFOR), broadly recognized in employment discrimination law: it constitutes a disproportionate imposition of a health intervention without workplace-related justification. Many countries have also tightened the ability to seek religious, medical, or philosophical exemptions, open to unclear decision-making and political interference (e.g., Reuters, 2021). Perhaps the most high-profile case to date involves the deportation of the top-ranked men's tennis player, Novak Djokovic, at the Australian Open 2022 despite having been granted a medical exemption for the tournament. The explicit characterization of Mr. Djokovic as a threat to Australian "civil order and public health" (Le Grand, 2022) underlines concerns of vaccine mandates and passports as a tool for authoritarian behavior.

There are also significant privacy issues with passports, which involve sharing medical information with strangers. Having set these population-wide passport precedents, it is conceivable that they could be expanded in the near future to include other personal health data including genetic tests and mental health records, which would create additional rights violations and discrimination based on biological status for employers, law enforcement, insurance companies, governments, and tech companies. Technology companies interested in biosurveillance using artificial intelligence and facial recognition technology have obtained large contracts to implement vaccine passports and now have a financial interest in maintaining and expanding them (Levine, 2022).

3.2. Political polarization

COVID-19 vaccine policies have generated intense political debate, mass street protests, and energized new populist coalition movements, with varied political views (Juen et al. 2021; Waszkiewicz et al. 2021). Opinion polls show that while many support these policies, others view them as inherently coercive, discriminatory, and counter to liberal values of bodily autonomy, freedom of choice and informed consent (de Figueiredo, 2021b; Shao and Hao, 2020). It is clear that current policies are divisive and unpopular with many people, even many vaccinated people (de Figueiredo, 2021b) and that they have become a source for collective rage and anger, notably for those who have been fired from their jobs or isolated and barred from social life.

COVID-19 vaccine policies may influence upcoming elections (van Dongen and Leidig, 2021). For instance, far-right and populist parties in Germany (the Alternative for Germany, AfD) and Austria (Freedom Party) have come out strongly against medical segregation (France 24, 2021). In 2022, the US Supreme Court struck down the Biden administration's federal vaccine mandate as unconstitutional, just as it came into effect for 80 million workers (albeit upholding the mandate for HCWs); republicans had long criticized the mandates (Rainey 2021, Wise 2021). In Martinique and Guadeloupe, vaccine passports have led to months of political unrest and violent protest that threaten the political stability of the French government. Pottinger (2021) argued that mandates and passports could trigger insurrection and civil war in South Africa.

Just as the smallpox vaccination mandates in 1850s Britain created the first "anti-vax" movement (Durbach, 2005; Fitzpatrick, 2005), the backlash against COVID-19 policies is energizing a global network connected by modern communication technology against these measures. These backlashes may contribute to increased distrust of other vaccines and foster new forms of radicalization and protest. While mainstream news outlets have voiced concern about the rising "anti-vaccination fervor" among the far-right, and potential for violence (Orr, 2022), center-left politicians have also used this rhetoric for their own agenda. In Canada, Prime Minister Trudeau used majority support for mandatory vaccination and passports to divide the conservative opposition in a recent federal election. In the USA, California, and New York (Democrat-controlled states) have implemented COVID-19 vaccine passports for children, while Florida and Texas (Republican-controlled) are introducing legislation to remove childhood school vaccine mandates in general. Some medical freedom and anti-vaccination groups have made increasingly alarming, false and inflammatory claims - e.g. calling vaccinators "needle Nazis" - which have been widely circulated on social media (Hotez, 2021a,b). In turn, pro-vaccine advocates have equated "anti-vaxxers" with domestic terrorists, calling for government agencies and social media companies to strengthen censorship laws. Political polarization and radicalization may increase if punitive and non-targeted vaccine policies continue.

3.3. Disunity in global health governance

Current vaccine policies risk furthering disunity in global health governance. Despite the World Health Organization stating that boosters will prolong the pandemic by contributing to vaccine hoarding and low supply (Miao, 2021), universities (including global health departments) in wealthy countries have mandated boosters for low-risk healthy students and faculty, when vaccination rates remain extremely low in many low- and middle-income countries (LMICs) (Ritchie et. al., 2020). Efforts to pressure pharmaceutical companies (who developed vaccines with the support of publicly funded research money) to remove patent protections have proved unsuccessful (Loftus, 2021; Rizvi 2021). Pharmaceutical companies have ensured that the costs of adverse effects are borne by governments (Allen, 2021); in turn, the world's tens of millions of migrants and asylum-seekers may be denied COVID-19 vaccines because of legal liability issues (Guarascio and Wongcha-um, 2021). Simultaneously, some scientists are calling the unvaccinated (as a homogenous group) the source for future variants ("variant factories") fueling inflammatory rhetoric (Goldman, 2021) that likely contributed to the heavily criticized reaction to close international borders to southern Africa during the spread of Omicron in late 2021.

The rollout of vaccine passports and mandates is financially costly and diverts resources and focus away from other interventions. In Canada, one billion dollars was pledged by the Trudeau government for vaccine passports (Tasker, 2021) and in New York State, the Excelsior Pass App-system developed by IBM will cost more than \$27 million (Levine, 2022). Importantly, the focus on "the unvaccinated" as the cause of health system collapse diverts public attention away from failures and deep structural challenges facing public health capacity in many countries and global equity failures. It absolves governments of attending to other strategies for opening schools and keeping public spaces safe. Perhaps more significantly, the indiscriminate influence of global agencies, pharmaceutical companies, and competition between the two global superpowers (China and the U.S.) may skew national health priorities in LMICs, taking budgets away from other important health priorities, especially if vaccination metrics are tied to international loans and financial agreements – a new form of vaccine colonialism.

4. Socio-economic impacts

4.1. Increasing disparity and inequality

The vaccine social science literature clearly shows that historically marginalized groups – those facing economic challenges and racial and minority groups – tend to have less confidence in vaccination programs and are more likely to be distrustful (Cook et. al. 2022; de Figueiredo et. al., 2021a; de Figueiredo et. al, 2020; Razai, et. al., 2021a). This raises the possibility that punitive COVID-19 vaccine policies may fuel existing inequity (Arguedes-Ramirez, 2021). A rapid policy briefing by the Nuffield Council on Bioethics (2020) emphasized that immunity passports could "create coercive and stigmatizing

work environments” and are “more likely to compound than redress...structural disadvantages and...social stigmatization.” It is highly likely that mandates and vaccine passports will be implemented in ways that discriminate against disadvantaged groups including immigrants, the homeless isolated elderly people, those with mental illness, specific cultural and religious groups, those in precarious living circumstances, and people with certain political views and values (e.g., libertarians). Moreover, communities who have historically been subject to state surveillance, segregation, structural racism, trauma or violence may be more likely to resist medical mandates, viewing them as authoritarian. In Israel, reports suggest that Bedouin and Palestinian communities in the Occupied Palestinian Territory have faced major barriers to vaccine access, with more distrust of vaccination and bureaucratic barriers to accessing and using green-passes even when vaccinated (Luster et al. 2021). Similar challenges have been raised among Europe’s Roma and in black communities in the UK and United States (de Figueiredo et. al., 2021a; Kamal, et. al., 2021; Milanović, 2021). Altogether, rather than enhancing human agency and strengthening communities and social cohesion, many current vaccine policies – including monthly fines for non-compliance (e.g. Greece and Austria) – may work to disempower individuals and contribute to long-term psychosocial stress and disharmony.

4.2. Reduced health system capacity

The pandemic has created immense strain on health systems, contributing to disruptions in global immunization programs (Causey et al. 2021), burnout of healthcare workers and mental health issues, which risk worsening clinical outcomes for all patients. These trends may be exaggerated by the current policy push towards mandatory COVID-19 vaccination of healthcare workers and firing of unvaccinated staff (Gur-Arie et al. 2021). Mandates and expulsions for healthcare workers are particularly unjustifiable for staff with post-infection immunity, which appears to be at least as strong as vaccine-induced (Gazit et. al., 2021; Hall et. al., 2021; Kojima and Klausner, 2022). Recent data on transmission (Wilder-Smith, 2022) further complicates the ethical claim that healthcare workers should be vaccinated to prevent staff-to-patient transmission.

Despite these considerations, many countries may lose frontline staff due to mandates. As of 31 December 2021, despite the forthcoming imposition of a vaccine mandate for patient-facing NHS workers, 8% of medical practitioners in the UK (73,000 people) remained unvaccinated (Faragher, 2021). In late 2021 Quebec (Canada) dropped its proposed mandate for healthcare workers, citing the devastating labor shortage it would cause on hospital systems (3% of staff, or 14,000, were unvaccinated) (Marratta, 2021).

4.3. Exclusion from work and social life

COVID-19 vaccination policies that disproportionately restrict people's access to work, education, public transport, and social life can be considered a violation of human rights, including the right to work (UN ICESCR art. 5, 1966). The economic effects of restricting access to work may also have indirect implications for dependents of the unvaccinated. A survey in October 2021 in the United States found that 37% of unvaccinated participants (5% of participants overall) would leave their job if their employer required them to get a vaccine or get tested weekly; this rose to 70% of unvaccinated participants (9% of all participants) if weekly testing was not an option (Hamel et al. 2021). Economic deprivation and parental stress resulting from restricted access to work and exclusion from social life may have long-term psychological and livelihood consequences on individuals, families and especially children. Commentators have also highlighted the potential impact of mandates in creating supply chain bottlenecks in certain commodities and with cross-border trade, and argued that changing vaccine rules and regulations threaten to negatively impact overall economic recovery in some sectors of the economy including tourism (Sampson, 2021).

5. The integrity of science and public health

5.1. Eroding of informed consent

Informed consent in standard healthcare settings requires that a person's decision to undertake a health treatment be voluntary, and that the person receive adequate information about the comparative risks and benefits and can weigh these with their individual circumstances. Voluntariness is considered undermined by undue influence, duress, threats of harm, and coercion (Lemmens 2015). The term 'structural coercion' has been introduced in the context of medical research to emphasize how social and economic contexts may seriously undermine autonomous decision making (Fisher 2013). As some of those supporting COVID-19 vaccine mandates recognize (Gostin 2021), and contrary to the media portrayal that "the unvaccinated are entirely free to decline", many policies clearly limit choice and the normal operation of informed consent. To many, these policies will function as coercion, and will not be viewed as "incentives" (ECDC, 2021; Nuki, 2021; Wilf-Miron et al. 2021). Some attach very serious consequences to refusal, such as loss of employment and livelihoods, potentially resulting in poverty and inability to care for family. Others are at first glance less restrictive (e.g., restricting access to bars, concerts, sports events, international travel, some healthcare settings), but can still lead to a significant exclusion from social life, thus creating pressure towards compliance.

The legal and ethical justification for such policies (and the reduced voluntariness of consent to vaccination) depends therefore on the public health-based rationale, i.e. particularly the ability to prevent significant harm to others, where less rights-restricting policies have failed or appear unlikely to achieve

an acceptable result. Yet, it has become clear that many current vaccine policies are not primarily aimed at reducing viral transmission but are rather focused on preventing individual morbidity and mortality. Governments have admitted that such policies are inherently designed to be coercive; in the words of French President Emmanuel Macron, the aim is to “piss off [the unvaccinated]...to the end. This is the strategy” (Henley, 2022). If these are the real goals, one can conclude that they not only limit, but largely disregard, the ethics of informed consent. Even when the rules of informed consent are constrained due to strong public health justifications, providing accurate information about risks and potential benefits to those who accept to be vaccinated remains a minimal requirement; it is unclear how current vaccine policies may compromise the integrity of this process. The net effect is that some individuals are likely being pushed or coerced into getting vaccinated while others are being systematically alienated from society. This includes individuals who have suffered due to past corporate malfeasance by pharmaceutical companies including Pfizer, who has a history of criminal and civil settlements in the billions of dollars, in part resulting from marketing practices and misrepresentation (Doshi et al. 2022). We should pause to consider the extent to which current policies, and how they are implemented in clinical settings, sets a precedent for the erosion of informed consent and abuse of public health powers into the future.

5.2. Erosion of trust in public health policy

The principle of proportionality requires that the benefits of a public health intervention outweigh the harms; and that no other less invasive measure are available. This principle is also a key condition in justifying mandates from a constitutional and human rights perspective (King et al. 2022; Lex-Atlas COVID-19, 2022). There are two proposed benefits of current vaccine policies: i) protection of others through reduced transmission and ii) reduced burden on healthcare systems (which also protects others where capacity is limited). Evidence strongly suggests that current vaccines have a weak and rapidly waning effect on preventing transmission for Delta and (increasingly so) for Omicron (Chemaitelly, et al., 2021; Eyre et al. 2022; Franco-Paredes, 2022; Goldberg, et. al, 2021; Kissler, et. al., 2021; Levin, et. al., 2021; Singanayagam et al. 2022). It must also be acknowledged that the original clinical trials on which these vaccines were approved did not include the reduction of transmission as end-points (Doshi et al. 2022). Prosser et al. (2021b) attempted to model the effectiveness of excluding unvaccinated people from social gatherings, work/study places, healthcare, and travel, finding that it was unlikely to have any significant impact on COVID-19 transmission, even using outdated vaccine trial efficacy data, which is likely to reduce their estimates further. Given the emergence of Omicron (Murray, 2022), existing seroprevalence studies showing moderate to high prior SARS-CoV-2 infection in many countries (McIntyre et al. 2022), and the increasing number of severe COVID-19 cases among the vaccinated (Alderwick, 2022), the rationale for current vaccine policies to prevent health systems from collapsing appears to be very questionable, despite data supporting that current vaccines continue to prevent against severe disease (Leon et al. 2022, UKHSA, 2022; ONS 2021b, Bajema et. al. 2021).

High existing rates of both voluntary vaccination and prior infection in most countries (McIntyre et al. 2022) suggest that the benefit of mandates, passports and segregated restrictions based on vaccine status will be small, and will decrease over time as more people have been infected at least once. Meanwhile, the direct harms (excluding people from education, work, and other key social goods) are significant, and indirect harms (as we note in other sections) may increase still further in the future.

These considerations suggest that many current COVID-19 vaccine policies have become increasingly disproportionate over time. Such policies may now be perceived, by many people, to be primarily aimed at “punishing” the unvaccinated as well as the need for a consistent, but overly simplistic, public health message. However, this may further erode trust in science, medicine and public health, especially if people perceive it to be unjustified. Mandating a 3rd booster dose for young boys to attend college or university in America, despite the lack of clinical data showing benefit, and some evidence that the risk of myocarditis adverse effects may outweigh the benefits in this group, and compound with each dose, has been widely discussed in the US media (Makary, 2021; Munro, 2021; Shaheen, 2022; Oster et al. 2022). Scandinavian countries have taken a precautionary and voluntary approach in their recommendations to the vaccination of children, with Sweden authorities stating that “[because of] a low risk for serious disease for kids, we don’t see any clear benefit with vaccinating them.” (Shaheen, 2022). This furthers the perception that current COVID-19 school vaccine mandates (e.g. in California) are disproportionate, especially as safety studies in young children remain relatively sparse (Rudan et al. 2021).

Finally, there is now a strong political incentive to generate data and evidence that shows such passport and mandate policies – which have effectively created two-tier societies and pressured people to be vaccinated – increased vaccination rates and “saved lives.” Will political forces influence the generation of such data and its dissemination in the media?

5.3. Erosion of trust in regulatory oversight

COVID-19 vaccines were developed in record time to meet an urgent public health need and have been accepted by billions of people; they have been estimated to have prevented millions of deaths, severe hospitalizations and long-term sequelae from SARS-CoV-2 (Meslé et al., 2021). COVID-19 vaccines have also generated an estimated \$100 billion of profit for pharmaceutical companies, especially Pfizer (Dransfield et al., 2021). Has the acceptance of mandates and passports – and the rhetoric around “anti-vaxxers” – contributed to a cultural shift in norms of transparency and accountability?

Governments have refused to disclose the details of contracts with manufacturers, including for additional booster doses or ‘next-generation’ vaccines (Rizvi, 2021; Transparency International, 2021). Vaccines are

typically not approved until two years of follow-up data is gathered (Rosenbaum, 2021), but given the circumstances of the COVID-19 pandemic, including international harmonization using new agile regulations, the novel mRNA COVID-19 vaccines were placed into emergency use in Europe and North America in late 2020 (Edmonds et al. 2020; Vural et al. 2021). There is concern that, in the fog of crisis, vaccine policy is being driven by vaccine manufacturers, rather than independent scientists (“the science”). For example, in April 2021, Moderna informed their investors that they were expecting a robust “variant booster market” as a source of profits. Similarly, Pfizer CEO Albert Bourla suggested that a fourth dose of vaccine would be necessary, without any clinical trial data or independent evaluation that the benefits of subsequent doses outweigh any risks, nor consideration of the changing clinical dynamics with the Omicron variant (Christensen et. al., 2022; Jassat et. al., 2021). This potentially only adds to distrust over decision-making around vaccine use and ensuing mandates.

The nature of mandates, passports, and segregated restrictions has increased public demands for scientific accountability and transparency – shown to be fundamental to building long-term confidence in vaccination (Goldenberg, 2021; Peterson et al. 2021). This has increased the need to diligently track all safety signals for adverse effects in specific demographics and explore trends in overall population mortality and potential non-specific effects (Benn et al 2020; Aaby et al. 2021). However, a few specific issues have emerged that have created public controversy. The original clinical trial data remain unavailable for independent scientific scrutiny (Doshi et al. 2022); a whistleblower raised important concerns about data integrity and regulatory oversight practices at a contract company helping with Pfizer’s clinical trials in the USA (Thacker, 2021). After a FOIA request by a civil society group (see: <https://phmpt.org>), the US Food and Drug Administration (FDA) requested (but was ultimately denied by a federal judge), 75 years to fully release internal documents and communications related to the regulatory process between FDA and Pfizer. Such efforts have only increased the perception among medical freedom groups, and the general public, that regulatory agencies are “captured” by industry, and would conveniently ignore a higher than usual adverse effect ratio to end the pandemic. Concerns have been raised about the lack of due process in vaccine injury compensation claims for the COVID-19 vaccines (Allen, 2021), which are to be borne by governments and not the pharmaceutical companies. A video of a US congressional roundtable on COVID-19 vaccine adverse events with medically confirmed vaccine injured individuals from the original clinical trials, a US military clinician, and Peter Doshi (senior editor of the BMJ) was permanently removed by YouTube (Stieber, 2021). These practices do not reinforce confidence that authorities are being transparent or applying optimal standards for regulatory safety efficacy and quality for these novel vaccines – standards which should arguably be more stringent given the legal precedent for mandates and passports.

6. Discussion

The adoption of new vaccination status policies has provoked a multilayered global and local backlash, resistance and polarization that threaten to escalate if current policies continue. It is important to emphasize that these policies are not viewed as “incentives” or “nudges” by substantial proportions of populations (de Figueiredo et al. 2021a; Porat 2021), especially in marginalized, underserved, or low COVID-19-risk groups. Denying individuals education, livelihoods, medical care, or social life unless they get vaccinated does not appear to coincide with constitutional and bioethical principles, especially in liberal democracies. While public support appears to have consolidated behind these policies in many countries, we should acknowledge that human rights frameworks were designed to ensure that rights are respected and promoted even during public health emergencies.

While we recognize that vaccination policies can be reconciled with, and are an important tool in, the promotion of the right to health, they need to be proportionate and designed such that they achieve a clearly defined public health goal. Those supporting current restrictions based on vaccination status (Gostin et al. 2021; King et al. 2021) seem to presume that these measures are indeed proportionate; that they are not more restrictive than strictly required; that they are effective in preventing transmission and protecting the health care system from collapse; and that there are no options available other than punitive mandates, passports and segregated restrictions based on vaccine status. As we have shown, we believe that current vaccine policies have failed on these fronts and are no longer fit-for-purpose.

We encourage social and behavioral scientists, bioethicists, epidemiologists, legal scholars, and others to urgently empirically assess the benefits and harms of COVID-19 vaccination policies. Empirical assessments may or may not validate the concerns presented in this paper—but their generation is critical in engagement with politicians, scientists, and organizations to reconsider current COVID-19 policies affecting those who remain unvaccinated. COVID-19 will not be the last public health emergency of international concern and it remains critical that we understand the policy mechanisms and governance inclinations that have so quickly adopted these approaches and provide robust evidence to improve future policy-making in times of crises (Bardosh et al. 2020). If not, the proclivity for mandates, passports, segregated lockdowns, fines, and punishments are likely to become a normative de facto feature for the next public health emergency, especially if they are institutionalized in the International Health Regulations (IHRs).

Are we now experiencing a paradigm-shift into a permanent annual cycle of mandatory COVID-19 vaccines, with ever-changing criteria depending on the latest booster? Will unvaccinated people face exclusions in society for years to come? Will we return to new mandates, and street battles between protesters and police, each time a new variant emerges? Will influenza vaccines and other vaccines now

become mandatory, including for low-risk groups? If unvaccinated people continue to refuse to be vaccinated in countries with strict punishments, what happens next? What is the end-goal and where is the policy off-ramp? Most importantly, what will this do for trust in global immunization programs and other public health measures?

Public health associated bureaucracies and society now risk having to increase coercion to address current and future resistance and, in the process, come to leverage strategies more consistent with policing than public health. Political forces may double-down and use people who have chosen not to vaccinate for myriad reasons as a scapegoating class while continuing to neglect much needed health and social system strengthening. Without appropriate empirical and ethical justification, current COVID-19 vaccine policies are a fundamental reflection of the failure of trust in public health strategy, something that is certainly rooted in decades of neoliberalism, austerity social policies and the growth of social media (Attwell et al. 2021). Future investments in public health capacity, especially health workers who can work in communities to build a relationship of trust, will be essential to engage in positive reform if mandates are not to become the new global strategy for addressing all future epidemics and pandemics. Data transparency, media independence and public debate and scrutiny about COVID-19 vaccine policies will be essential to maintain population trust, help people better understand the risks and benefits of the continued use of current vaccines and to inform research on improvements and future policies.

It is time for policy to regain a focus on non-coercive public health measures, including pro-social language and community leadership for vaccination, especially to protect high-risk groups (McIntyre et al. 2022). There are other options to address the pandemic and it is not too late to return to empowering, transparent, and community-informed policies based on equity and non-discrimination that many public health practitioners have been calling for since the outset. As we have argued above, the scientific case for punitive COVID-19 vaccine policies, given the proprietary nature of our current vaccines, no longer fits with pre-pandemic bioethical norms and public health ethics. Rather, it appears to be fulfilling a collective, psychological and political need for scapegoating and to reinforce a false notion of safety among vaccinated people as they attempt to resume social and economic life (Gostin et al. 2021). Policy makers should reflect on the necessity of enforcing what is essentially a new two-tier, segregated social system and how this will affect different social groups now and into the future – behaviourally, politically and socio-economically – as well as the impact of such policies on the integrity of science and public health itself. As we have attempted to show, it may very well be that the risks and harms of punitive public health strategies far outweigh the benefits.

Disclaimer: The opinions expressed here are those of the authors and not necessarily those of their employing institutions.

Competing interests: Within the past two years, AdF was involved in Vaccine Confidence Project collaborative grants with Janssen Pharmaceutica outside of the submitted work and holds a Merck grant to investigate COVID-19 vaccine attitudes.

Acknowledgements: We would like to thank an anonymous reviewer for their critical feedback on an early draft. Funding was provided to KB through a Wellcome Trust Society and Ethics Fellowship (10892/B/15/ZE). EJ also received funding from the Wellcome Trust UK (grant numbers 221719 and 216355).

References

Aaby, P., Benn, C. S., Flanagan, K. L., Klein, S. L., Kollmann, T. R., Lynn, D. J., & Shann, F. (2020). The non-specific and sex-differential effects of vaccines. *Nature Reviews Immunology*, 20(8) 464–470.

Allen, A. (2021). Federal vaccine court hasn't helped those whose lives were altered by COVID-19 vaccines. <https://www.latimes.com/science/story/2021-08-17/severe-covid-vaccine-injuries-help-federal-vaccine-court>. Accessed January 27, 2022.

Alderwick, H. (2022). Is the NHS overwhelmed? *bmj*, 376.

Albarracín, D., Jung, H., Song, W., Tan, A., & Fishman, J. (2021a). Rather than inducing psychological reactance, requiring vaccination strengthens intentions to vaccinate in US populations. *Scientific reports*, 11(1), 1–9.

Albarracín, D., Jung, H., Song, W., Tan, A., & Fishman, J. (2021b). Rather than inducing psychological reactance, requiring vaccination strengthens intentions to vaccinate in US populations. *OSF data* https://osf.io/y2rjn/?view_only=1f313bc39b234ed4be0d30c44d8ff126 (accessed 28 January 2022)

American Medical Association. (2021). Can physicians decline unvaccinated patients? Updated September 15, 2021. <https://www.ama-assn.org/delivering-care/ethics/can-physicians-decline-unvaccinated-patients#:~:text=In%20general%2C%20no%2C%20a%20physician,or%20declines%20to%20be%20vaccinated>. Accessed January 27, 2022.

Andrews, N., Tessier, E., Stowe, J., Gower, C., Kirsebom, F., Simmons, R., et al. (2022). Duration of Protection against Mild and Severe Disease by Covid-19 Vaccines. *New England Journal of Medicine*. In press.

- Arguedas-Ramirez, G. (2021) Build that wall! Vaccine certificates, passes and passports, the distribution of harm and decolonial global health justice. *Journal of Global Ethics* 1-13. DOI: [10.1080/17449626.2021.2002391](https://doi.org/10.1080/17449626.2021.2002391)
- Attwell, K., Harper, T., Rizzi, M., Taylor, J., Casigliani, V., Quattrone, F., & Lopalco, P. (2021). Inaction, under-reaction and incapacity: communication breakdown in Italy's vaccination governance. *Policy Sciences*, 1-19.
- Bajema, K. L., Dahl, R. M., Prill, M. M., Meites, E., Rodriguez-Barradas, M. C., Marconi, V. C., ... & Enteric, S. P. (2021). Effectiveness of COVID-19 mRNA Vaccines Against COVID-19–Associated Hospitalization—Five Veterans Affairs Medical Centers, United States, February 1–August 6, 2021. *Morbidity and Mortality Weekly Report*, 70(37), 1294.
- Bamgboye, E. L., Omiye, J. A., Afolaranmi, O. J., Davids, M. R., Tannor, E. K., Wade, S. ... & Naicker, S. (2021). COVID-19 pandemic: is Africa different?. *Journal of the National Medical Association*, 113(3), 324-335.
- Bardosh, K. L., de Vries, D. H., Abramowitz, S., Thorlie, A., Cremers, L., Kinsman, J. & Sellmach, D. (2020). Integrating the social sciences in epidemic preparedness and response: A strategic framework to strengthen capacities and improve Global Health security. *Globalization and Health*, 16(1), 1-18.
- BBC News. Covid: France tightens restrictions amid Omicron surge (2022 a.) <https://www.bbc.co.uk/news/world-europe-59805829> (accessed 27 January 2022).
- BBC News. AstraZeneca vaccine: How do you weigh up the risks and benefits? (2021b.) <https://www.bbc.co.uk/news/explainers-56665396> (accessed 30 January 2022).
- Bekiempis, V. (2022). Teens and young adults driving record Covid cases in US, health officials say. *The Guardian*. Published January 1, 2022. <https://www.theguardian.com/us-news/2022/jan/01/us-omicron-covid-cases-teens-young-adults-children> Accessed January 27, 2022.
- Bell, S., Clarke, R.M., Ismail, S.A., Ojo-Aromokudu, O., Naqvi, H., Coghill, Y., Donovan, H., Letley, L., Paterson, P. and Mounier-Jack, S. (2021.) COVID-19 vaccination beliefs, attitudes, and behaviours among health and social care workers in the UK: a mixed-methods study. *medRxiv*.
- Benn, C. S., Fisker, A. B., Reckmann, A., Sørup, S., & Aaby, P. (2020). Vaccinology: time to change the paradigm? *The Lancet Infectious Diseases*.
- Biswas, M., Rahaman, S., Biswas, T.K., Haque, Z. and Ibrahim, B. (2021.) Association of sex, age, and comorbidities with mortality in COVID 19 patients: a systematic review and meta-analysis. *Intervirology*, 64(1), pp.36-47.
- Block, J., 2021. Vaccinating people who have had covid-19: why doesn't natural immunity count in the US?. *BMJ*, 374.
- Bradley, V. C., Kuriwaki, S., Isakov, M., Sejdinovic, D., Meng, X. L., & Flaxman, S. (2021). Unrepresentative big surveys significantly overestimated US vaccine uptake. *Nature*, 600(7890), 695-700.

- Broadfoot, M. (2022). Why Omicron Is Putting More Kids in the Hospital. *Scientific American*. Published January 25, 2022. <https://www.scientificamerican.com/article/why-omicron-is-putting-more-kids-in-the-hospital/>. Accessed January 27, 2022.
- Causey, K., Fullman, N., Sorensen, R.J., Galles, N.C., Zheng, P., Aravkin, A., Danovaro-Holliday, M.C., Martinez Piedra R., Sodha, S.V., Velandia-González, M.P. and Gacic-Dobo, M. (2021). Estimating global and regional disruptions to routine childhood vaccine coverage during the COVID-19 pandemic in 2020: a modelling study. *The Lancet*, 398(10299) pp 522-534.
- Chemaitelly, H., Tang, P., Hasan, M.R., AlMukdad, S., Yassine, H.M., Benslimane, F.M., Al Khatib H.A Coyle, P., Ayoub, H.H., Al Kanaani, Z. and Al Kuwari, E. (2021). Waning of BNT162b2 vaccine protection against SARS-CoV-2 infection in Qatar. *New England Journal of Medicine*, 385(24), p.e83.
- Christensen, P.A., Olsen, R.J., Long, S.W., Snehal, R., Davis, J.J., Saavedra, M.O., Reppond, K , Shyer, M.N., Cambric, J., Gadd, R. and Thakur, R.M. (2022.) Early signals of significantly increased vaccine breakthrough, decreased hospitalization rates, and less severe disease in patients with COVID-19 caused by the Omicron variant of SARS-CoV-2 in Houston, Texas. *medRxiv*, pp.2021-12.
- Christie, B., 2022. Covid-19: Fact check—how many patients in hospital are unvaccinated? (2022) *BMJ* 2022;376:o5
- Cook, E.J., Elliott, E., Gaitan, A., Nduka, I., Cartwright, S., Egbutah, C. Randhawa, G., Waqar, M. and Ali, N. (2022.) Vaccination against COVID-19: Factors That Influence Vaccine Hesitancy among an Ethnically Diverse Community in the UK. *Vaccines*, 10(1), p.106.
- Coombes, R., & Davies, M. (2022). Facebook versus The BMJ: when fact checking goes wrong. *bmj*, 376.
- Daily Mail, The (2021). Just 6 out of 6million Britons given AstraZeneca's Covid jab have suffered blood clots after their second dose, official data shows. <https://www.dailymail.co.uk/news/article-9550845/Just-6-6million-given-AstraZeneca-Covid-jab-suffered-blood-clots-second-dose.html> (accessed 30 January 2022)
- Doshi, P., Godlee, F., & Abbasi, K. (2022). Covid-19 vaccines and treatments: we must have raw data, now. *bmj*, 376.
- DeRoo, S. S., Pudalov, N. J., & Fu, L. Y. (2020). Planning for a COVID-19 vaccination program. *Jama*, 323(24), 2458-2459.
- Drury, J., Mao, G., John A., Kamal, A., Rubin, G. J., Stott, C., ... & Marteau, T. M. (2021). Behavioural responses to COVID-19 health certification: A rapid review. *BMC Public Health*, 21(1), 1-16.
- de Figueiredo, A.; Karafillakis, E.; Larson, H.J. *State of Vaccine Confidence in the EU+UK*; A Report for the European Commission Public Relations Office of the European Union: Luxembourg, 2020.
- de Figueiredo, A., Larson, H. J., & Reicher, S. D. (2021a). The potential impact of vaccine passports on inclination to accept COVID-19 vaccinations in the United Kingdom: evidence from a large cross-sectional survey and modelling study. *medRxiv*.
- de Figueiredo, A. and Larson, H.J. (2021b). Exploratory study of the global intent to accept COVID-19 vaccinations. *Communications Medicine*, 1(1), pp.1-10.

Dransfield, S., Rusu, L., Thériault, A. (2021). Pfizer, BioNTech and Moderna making \$1,000 profit every second while world's poorest countries remain largely unvaccinated. Oxfam. Published November 16, 2021. <https://www.oxfam.org/en/press-releases/pfizer-biontech-and-moderna-making-1000-profit-every-second-while-worlds-poorest>. Accessed January 27, 2022.

Durbach, N., 2005. *Bodily matters: The anti-vaccination movement in England, 1853–1907*. Duke University Press.

DW. COVID: EU vaccine passports only valid 9 months without booster. (2021.) <https://www.dw.com/en/covid-eu-vaccine-passports-only-valid-9-months-without-booster/a-60204437> (accessed 28 January 2022)

European Centers for Disease Control (ECDC) (2021.) Facilitating COVID-19 vaccination acceptance and uptake in the EU/EEA. Technical Report. <https://www.ecdc.europa.eu/sites/default/files/documents/Facilitating-vaccination-uptake-in-the-EU-EEA.pdf> (accessed 30 January 2022).

Eyre, D. W., Taylor, D., Purver, M., Chapman, D., Fowler, T., Pouwels, K. B., ... & Peto, T. E. (2022). Effect of COVID-19 Vaccination on Transmission of Alpha and Delta Variants. *New England Journal of Medicine*.

Faragher, J. (2021) NHS vaccine mandate could cost 73,000 staff. See: <https://www.personneltoday.com/hr/nhs-vaccine-mandate-could-cost-73000-staff/>. Accessed January 27, 2022.

Fitzpatrick M. (2005). The Anti-Vaccination Movement in England, 1853-1907. *Journal of the Royal Society of Medicine*, 98(8), 384–385.

Fisher, J. A. (2013). Expanding the frame of "voluntariness" in informed consent: structural coercion and the power of social and economic context. *Kennedy Institute of Ethics Journal*, 23(4), 355-379.

France 24. (2021). Far-right AfD campaign on anti-vax platform in Germany's Bautzen. Published September 22, 2021. <https://www.france24.com/en/europe/20210922-far-right-afd-campaigns-on-anti-vax-platform-in-germany-s-bautzen-ahead-of-polls>. Accessed January 27, 2022.

Franco-Paredes, C. (2022). Transmissibility of SARS-CoV-2 among fully vaccinated individuals. *The Lancet Infectious Diseases*, 22(1), 16.

Forbes. (2021). Why you should be vaccinated even if you've already had COVID-19. <https://www.ors.com/sites/johndrake/2021/08/19/why-you-should-be-vaccinated-even-if-youve-already-had-covid-19/?sh=5c1002d2d4bc> (accessed 20 January 2022)

GAVI Why vaccine side-effects might be more common in people who've already had COVID-19. (2021.) <https://www.gavi.org/vaccineswork/why-vaccine-side-effects-might-be-more-common-people-whove-already-had-covid-19> (accessed 20 January 2022).

Gazit, S., Shlezinger, R., Perez, G., Lotan, R., Peretz, A., Ben-Tov, A., Cohen, D., Muhsen, K., Chodick, G. and Patalon, T. (2021.) Comparing SARS-CoV-2 natural immunity to vaccine-induced immunity: reinfections versus breakthrough infections. *MedRxiv*.

Goldberg, Y., Mandel, M., Bar-On, Y.M., Bodenheimer, O., Freedman, L., Haas, E.J., Milo, R., Alroy-Preis, S., Ash, N. and Huppert, A. (2021.) Waning immunity after the BNT162b2 vaccine in Israel. *New England Journal of Medicine* 385(24), p.e85.

Goldman, E. (2021). How the unvaccinated threaten the vaccinated for COVID-19: a Darwinian perspective. *Proceedings of the National Academy of Sciences of the United States of America*, 118(39).

Gostin, L. O., Cohen, I. G., & Shaw, J. (2021). Digital Health Passes in the Age of COVID-19: Are “Vaccine Passports” Lawful and Ethical? *JAMA*, 325(19), 1933-1934.

Guarascio, F. and Wongcha-um, P. (2021). Refugees lack COVID shots because drugmakers fear lawsuits, documents show. *Reuters*. Published December 16, 2021. <https://www.reuters.com/world/refugees-lack-covid-shots-because-drugmakers-fear-lawsuits-documents-2021-12-16/>. Accessed January 27, 2022.

The Guardian. Macron tells critics: vaccine passport will protect all our freedoms. (2021a.) <https://www.theguardian.com/world/2021/aug/08/macron-tells-critics-vaccine-passport-will-protect-all-our-freedoms> (accessed 27 January 2022).

The Guardian. Doctors warn over increasing number of young people with Covid in ICU. (2021b). <https://www.theguardian.com/world/2021/jul/25/seriously-ill-young-people-in-current-covid-admissions-expert-warns> (accessed 28 January 2022).

The Guardian. Fully vaccinated people account for 1.2% of England's Covid-19 deaths. (2021c). <https://www.theguardian.com/world/2021/sep/13/fully-vaccinated-people-account-for-12-of-englands-covid-19-deaths> (accessed 30 January 2022)

Hall, V. J., Foulkes, S., Charlet, A., Atti, A., Monk, E. J., Simmons, R., ... & Cowley, A. (2021). SARS-CoV-2 infection rates of antibody-positive compared with antibody-negative health-care workers in England: a large, multicentre, prospective cohort study (SIREN). *The Lancet*, 397(10283), 1459-1469.

Hippisley-Cox, J., Paton, M., Mei, X.W., Saatci, D., Dixon, S., Khunti, K., Zaccardi, F., Watkinson, P., Shankar-Hari, M., Doidge, J. and Harrison, D.A. (2021.) Risk of thrombocytopenia and thromboembolism after covid-19 vaccination and SARS-CoV-2 positive testing: self-controlled case series study. *bmj*, 374.

Hotez, P. (2021a). COVID vaccines: time to confront anti-vax aggression. *Nature*, 592(7856), 661-661.

Hotez, P. J. (2021b). Mounting antisience aggression in the United States. *PLoS biology*, 19(7), e3001369.

Hotez, P., Batista, C., Ergonul, O., Figueroa, J. P., Gilbert, S., Gursel, M., et al. (2021). Correcting COVID-19 vaccine misinformation: Lancet Commission on COVID-19 vaccines and therapeutics task force members. *EClinicalMedicine*, 33.

Jørgensen, F. J., Bor, A., & Petersen, M. B. (2021). Increased pressure leads to decreased trust among the unvaccinated: Effects of the announcement of the re-introduction of Covid passports in Denmark. *PsyArxiv*.

Juen, C. M., Jankowski, M., Huber, R. A., Frank, T., Maaß, L., & Tepe, M. (2021). Who wants COVID-19 vaccination to be compulsory? The impact of party cues, left-right ideology, and populism. *Politics*, 02633957211061999

Kamal, A., Hodson, A. and Pearce, J.M. (2021.) A rapid systematic review of factors influencing COVID-19 vaccination uptake in minority ethnic groups in the UK. *Vaccines*, 9(10), p.1121.

Kampf, G. (2021). COVID-19: stigmatising the unvaccinated is not justified. *The Lancet* 398(0314), 1871.

Karaivanov, A., Kim, D., Lu, S. E., & Shigeoka, H. (2021). *COVID-19 Vaccination Mandates and Vaccine Uptake* (No. w29563). National Bureau of Economic Research.

Hamel, L., et al. (2021). KFF COVID-19 vaccine monitoring, October 2021. See: <https://www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-october-2021/>. Accessed January 27, 2022.

Henley, J. (2022). Macron declares his Covid strategy is to 'piss off' the unvaccinated. <https://www.theguardian.com/world/2022/jan/04/macron-declares-his-covid-strategy-is-to-piss-off-the-unvaccinated>. Accessed January 27, 2022.

Jassat, W., Karim, S.A., Mudara, C., Welch, R., Ozougwu, L., Groome, M., Govender, N., von Gottberg, A., Wolter, N., Blumberg, L. and Cohen, C. (2021.) Clinical severity of COVID-19 patients admitted to hospitals in Gauteng, South Africa during the Omicron-dominant fourth wave *DATCOV Author and Blumberg, Lucille and Cohen, Cheryl, Clinical Severity of COVID-19 Patients Admitted to Hospitals in Gauteng, South Africa During the Omicron-Dominant Fourth Wave (December 29, 2021)*.

King J., Ferraz OLM., Jones A (2022) Mandatory COVID-19 vaccination and human rights. *The Lancet* 399; 220-222

Kissler, S. M., Fauver, J. R., Mack, C., Tai, C. G., Breban, M. I., Watkins, A. E., ... & Grad, Y. H. (2021). Viral dynamics of SARS-CoV-2 variants in vaccinated and unvaccinated persons. *New England Journal of Medicine*, 385(26), 2489-2491

Kojima, N., & Klausner J. D. (2022). Protective immunity after recovery from SARS-CoV-2 infection. *The Lancet Infectious Diseases*, 22 (1), 12-14.

Krimer, F., Srivastava, K. and Simon, V. (2021.) Robust spike antibody responses and increased reactogenicity in seropositive individuals after a single dose of SARS-CoV-2 mRNA vaccine. *MedRxiv*.

Larson, H.J., Clarke, R.M., Jarrett, C., Eckersberger, E., Levine, Z., Schulz, W.S. and Paterson, P. (2018). Measuring trust in vaccination: A systematic review. *Human vaccines & immunotherapeutics*, 14(7), pp.1599-1609.

Lazarus, J.V., Ratzan, S.C., Palayew, A., Gostin, L.O., Larson, H.J., Rabin, K., Kimball, S. and El-Mohandes, A. (2021). A global survey of potential acceptance of a COVID-19 vaccine. *Nature medicine*, 27(2), pp.225-228.

Le Grand, C. (2022). Australia declares Djokovic a risk to civil order and public health. https://www.theage.com.au/sport/australia-declares-djokovic-a-risk-to-civil-order-and-public-health-20220114_59oex.html. Accessed January 27, 2022.

Lemmens T. (2015) Informed Consent. in Joly Y. & Knoppers BM. *Routledge Handbook of Medical Law and Ethics* (London: Routledge) 27-51

León, T. M. et al. (2022). COVID-19 Cases and Hospitalizations by COVID-19 Vaccination Status and Previous COVID-19 Diagnosis—California and New York, May–November 2021. *MMWR. Morbidity and Mortality Weekly Report*, 71.

Levin, E.G., Lustig, Y., Cohen, C., Fluss, R., Indenbaum, V., Amit, S., Doolman, R., Asraf, K., Mendelson, E., Ziv, A. and Rubin, C. (2021.) Waning immune humoral response to BNT162b2 Covid-19 vaccine over 6 months. *New England Journal of Medicine*, 385(24), p.e84.

Levine, J. (2022) Vaccine Passports Are Here to Stay. Why Worry? *The Intercept Voices*. Published January 1, 2022. <https://theintercept.com/2022/01/01/covid-vaccine-passports-surveillance/>. Accessed January 27, 2022.

Lex-Atlas COVID 19. (2021) Legal, constitutional and ethical principles for mandatory vaccination requirements for COVID-19. Published 29 October 2021. <https://lexatlas-c19.org/legal-constitutional-and-ethical-principles-for-mandatory-vaccination-requirements-for-covid-19/> Accessed January 28, 2022.

Loftus, P. (2021). Who Invented Covid-19 Vaccines? Drugmakers Battle Over Patents. *The Wall Street Journal*. Published December 29, 2021. <https://www.wsj.com/article/who-invented-covid-vaccines-11640726776>. Accessed January 27, 2022.

Luster, T., Albin, E., Gross, A., Tabenkin, M. & Davidovitch, N. (2021). Promoting Vaccination from a Human Rights and Equity Perspective: Lessons from the Israeli “Green Pass”. *European Journal of Risk Regulation*, 12(2), 308-320.

Male, V. (2021). Menstrual changes after covid-19 vaccination. *BMJ*, 374.

Maratta, A. (2021) COVID-19: Quebec drops vaccination mandate for health-care workers. <https://globalnews.ca/news/8346947/quebec-drops-vaccine-mandate-among-health-care-workers/>. Accessed January 27, 2022.

Makary, M. (2021) The Dangerous Push to Give Boosters to Teens. See: <https://www.wsj.com/articles/dangerous-push-to-give-boosters-to-teens-vaccine-covid-19-omicron-vaxx-requirement-mandate-11640107759>. Access January 27, 2022.

McHugh, K. J., Jing, L., Severt, S. Y., Cruz, M., Sarmadi, M., Jayawardena, H. S. N., ... & Jaklenec, A. (2019). Biocompatible near infrared quantum dots delivered to the skin by microneedle patches record vaccination. *Science translational medicine*, 11 (523).

- McIntyre, P. B., Aggarwal, R., Jani, I., Jawad, J., Kochhar, S., MacDonald, N., et al. (2022). COVID-19 vaccine strategies must focus on severe disease and global equity. *The Lancet*, 399 (10322): 406-410.
- Meslé, M. M., Brown, J., Mook, P., Hagan, J., Pastore, R., Bundle, N., ... & Pebody, R. G. (2021). Estimated number of deaths directly averted in people 60 years and older as a result of COVID-19 vaccination in the WHO European Region, December 2020 to November 2021. *Eurosurveillance*, 26(47), 2101021.
- Mevorach, D., Anis, E., Cedar, N., Bromberg, M., Haas, E.J., Nadir, E., Olsha-Castell, S., Arad, D., Hasin, T., Levi, N. and Asleh, R., 2021. Myocarditis after BNT162b2 mRNA vaccine against COVID-19 in Israel. *New England Journal of Medicine*, 385(23), pp.2140-2149.
- Miao, H. (2021) WHO says Covid booster programs limit vaccine supply for poor countries, could prolong pandemic. <https://www.cnn.com/2021/12/22/who-says-covid-vaccine-booster-programs-will-prolong-pandemic.html>. Accessed January 27, 2022.
- Milanović, M. (2021.) The Compatibility of Covid Passes with the Prohibition of Discrimination. *Pravni zapisi*, (2), pp.357-370.
- Mills, M. C., & Rüttenauer, T. (2022). The effect of mandatory COVID-19 certificates on vaccine uptake: synthetic-control modelling of six countries. *The Lancet Public Health*, 7(1), e15- 22.
- Munro, C. (2021). Covid-19: Boys are more at risk of myocarditis after vaccination than of hospital admission for covid. 374, n2251.
- Murray, C. J. (2022). COVID-19 will continue but the end of the pandemic is near. *The Lancet*. 399 (10323): 417-419.
- National Academy for State Health Policy (NAHSP). States' COVID-19 Public Health Emergency Declarations and Mask Requirements. Updated January 11, 2022. <https://www.nashp.org/governors-prioritize-health-for-all/>. Accessed January 27, 2022.
- National Public Radio. "Dr. Fauci Answers Questions about Children and Covid-19 Vaccines." NPR. 27 Oct. 2021, <https://www.npr.org/2021/10/27/1049546323/dr-fauci-answers-questions-about-children-and-covid-19-vaccines>. Accessed January 21, 2022.
- NBC News. (2021.) 'Hybrid immunity': Why people who had Covid should still get vaccinated. <https://www.nbcnews.com/health/health-news/hybrid-immunity-people-covid-still-get-vaccinated-rcna1974> (accessed 20 January 2022)
- New York Times (2021a). Can vaccinated people spread the virus? We don't know, scientists say. *The New York Times*. <https://www.nytimes.com/2021/04/01/health/coronavirus-vaccine-walensky.html> (accessed 20 January 2022)
- Nordström, P., Ballin, M., and Nordström, A. (2021) Effectiveness of COVID-19 vaccination against risk of symptomatic infection, hospitalization, and death up to 9 months: a Swedish total-population cohort study.

NSW Government. New freedoms for vaccinated first step on state roadmap out of COVID 26 August 2021. (2021.) https://www.health.nsw.gov.au/news/Pages/20210826_01.aspx (accessed 27 January 2022).

Nyhan, B., Reifler, J., Richey, S., & Freed, G. L. (2014). Effective messages in vaccine promotion: a randomized trial. *Pediatrics*, 133(4), e835-e842

Nuki, P. (2021) We may need vaccine passports as an incentive for the young to do right by the herd The Daily Telegraph. <https://www.telegraph.co.uk/global-health/science-and-disease/may-need-vaccine-passports-herd-immunity-use-carrots-entice/> (accessed 30 January 2022)

Nuffield Council on Bioethics (2020) COVID-19 antibody testing and 'immunity certification'. <https://www.nuffieldbioethics.org/news/new-briefing-covid-19-antibody-testing-and-immunity-certification>. Accessed 2 Oct 2020.

Orr, C (2022) Experts warn of violence as alarming demonstration ushers in new era of anti-vaccine fervor. See: <https://www.nationalobserver.com/2022/01/12/analysis/experts-warn-violence-alarming-demonstration-ushers-new-era-anti-vaccine-fervor>. (Accessed January 27, 2022).

Omer, S. B., Betsch, C., & Leask, J. (2019). Mandate vaccination with care. *Nature*, 571(7766), 469-473

ONS. Coronavirus Infection Survey. (2021a) <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/coronaviruscovid19infectionsurveycharacteristicsofpeopletestingpositiveforcovid19uk/19january2022> (accessed 26 January 2022)

ONS. Deaths involving COVID-19 by vaccination status, England: deaths occurring between 1 January and 31 October 2021. (2021b) <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/deathsinvolvingcovid19byvaccinationstatusengland/deathsoccurringbetween1januaryand31october2021> (accessed 27 January 2021)

ONS. Coronavirus and vaccination rates in people aged 18 years and over by socio-demographic characteristic and occupation, England: 8 December 2020 to 31 December 2021. (2021c) <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthinequalities/bulletins/coronavirusandvaccinationratesinpeopleaged18yearsandoverbysociodemographiccharacteristicandoccupationengland/8december2020to31december2021> (accessed 27 January 2022)

Oster, M. E., Shay, D. K., Su, J. R., Gee, J., Creech, C. B., Broder, K. R., et al. (2022). Myocarditis Cases Reported After mRNA-Based COVID-19 Vaccination in the US From December 2020 to August 2021. *JAMA*, 327(4), 331-340.

Palaodimos L., Kokkinidis, D.G., Li, W., Karamanis, D., Ognibene, J., Arora, S., Southern, W.N. and Mantzoros, C.S (2020) Severe obesity, increasing age and male sex are independently associated with worse in-hospital outcomes, and higher in-hospital mortality, in a cohort of patients with COVID-19 in the Bronx, New York. *Metabolism*, 108, p.154262.

Paterlini, M., 2021. Covid-19: Italy sees protests against mandatory health passports for workplaces. (2022.) *BMJ* 2021;375:n2575.

Patone, M., Mei, W.X., Handunnetthi, L., Dixon, S., Zaccardi, F., Shankar-Hari, M., Watkinson, P., Khunti, K., Henden A., Coupland, C.A. and Channon, K.M. (2021). Risk of myocarditis following sequential COVID-19 vaccination by age and sex. *medRxiv*.

Petersen, M. B., Bor, A., Jørgensen, F., & Lindholt, M. F. (2021). Transparent communication about negative features of COVID-19 vaccines decreases acceptance but increases trust. *Proceedings of the National Academy of Sciences*, 118(29).

Pohler, D., Gomez R. (2021) Why vaccine mandates are in legal trouble *The Line* (23 Nov. 2021) online: <https://theline.substack.com/p/dionne-pohler-and-rafael-gomez-why>. Accessed January 27, 2022.

Project Halo (2021a) My child has already had COVID-19, why should they get the vaccine? YouTube video <https://www.youtube.com/watch?v=JRaWmsH7lgw> (accessed 29 January 2022)

Prosser, A., & Streiner, D. L. (2021a). A study of the benefits of vaccine mandates and vaccine passports for SARS-CoV-2. *medRxiv*.

Prosser, A., Helfer, B., & Streiner, D. L. (2021b). Evaluating the number of unvaccinated people needed to exclude to prevent SARS-CoV-2 transmissions. *medRxiv*.

Porat, T., Burnell, R., Calvo, R. A., Ford, E., Paudyal, P., Baxter, W. L., & Parush, A. (2021). "Vaccine Passports" May Backfire: Findings from a Cross-Sectional Study in the UK and Israel on Willingness to Get Vaccinated against COVID-19. *Vaccines*, 9(8), 902.

Rainey, R. (2021). Federal court blocks Biden administration's mandate. *Politico*. Published November 6, 2021. <https://www.politico.com/news/2021/11/06/biden-vaccine-order-blocked-federal-court-519908>. Accessed January 27, 2021.

Ram, N., & Gray, D. (2020). Mass surveillance in the age of COVID-19. *Journal of Law and the Biosciences*, 7(1), 15aa023.

Razai, M.S., Osama, T., McKechnie, D.G. and Majeed, A. (2021.) COVID-19 vaccine hesitancy among ethnic minority groups. *BMJ*, 372.

Reuters (2020) WHO against making coronavirus vaccine mandatory. <https://www.reuters.com/business/healthcare-pharmaceuticals/who-does-not-envisage-covid-19-vaccines-being-made-mandatory-2020-12-11/> (accessed January 27 2022).

Reuters (2021) Maine can bar religious exemptions to COVID-19 vaccine mandate, judge rules. <https://www.reuters.com/world/us/maine-can-bar-religious-exemptions-covid-vaccine-mandate-judge-rules-2021-10-13/> accessed January 30 2022).

Ritchie, H., Mathieu, E., Rod s-Guirao, L., Appel, C., Giattino, C., Ortiz-Ospina, E., Hasell, J., Macdonald B., Beltekian D., and Roser, M. (2020) - "Coronavirus Pandemic (COVID-19)". Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/coronavirus' [Online Resource] (accessed 27 January 2022).

Rizvi, Z. (2021) Pfizer's Power. Public Citizen: Access to Medicine Program. Available: <https://www.citizen.org/article/pfizers-power/?eType=EmailBlastContent&eId=9b708ddb-d34d-4dfa-95e4-d4d72a82a1b>. Accessed January 30, 2022.

Rosenbaum, L. (2021). Escaping Catch-22-Overcoming Covid Vaccine Hesitancy. *The New England journal of medicine*, 384(14), 1367-1371.

The Royal Society (2022) *The online information environment: Understanding how the internet shapes people's engagement with scientific information*. <http://ti-health.org/wp-content/uploads/2021/05/For-Whose-Benefit-Transparency-International.pdf> (accessed 27 January 2022).

Transparency International (2021). For Whose Benefit? Transparency in the development and procurement of COVID-19 vaccines. <http://ti-health.org/wp-content/uploads/2021/05/For-Whose-Benefit-Transparency-International.pdf> (accessed January 29, 2022.)

Rudan, I., Adeloye, D., Katikireddi, V., Murray, J., Simpson C., Shah, S. A., et al. (2021). The COVID-19 pandemic in children and young people during 2020-2021: A complex discussion on vaccination. *Journal of Global Health*, 11.

Pottinger, B. (2021) South Africa's looming vaccine revolt. See: <https://unherd.com/2021/12/south-africas-looming-vaccine-revolt/> (accessed 26 January 2022).

Powell, A.A., Kirsebom, F., Stowe, J., McOwat, K., Saliba, V., Ramsay, M.E., Bernal, J.L., Andrews, N. and Ladhani, S.N., 2021. Adolescent vaccination with BNT162b2 (Comirnaty, Pfizer-BioNTech) vaccine and effectiveness of the first dose against COVID-19: national test-negative case-control study, England. *medRxiv*.

Pyle, G. and Huang, J.H. (2022) Myocarditis: COVID-19 is a much bigger risk to the heart than vaccination. *The Conversation*. Updated January 21, 2022. <https://theconversation.com/myocarditis-covid-19-is-a-much-bigger-risk-to-the-heart-than-vaccination-17458> Accessed January 27, 2022.

Sampson, H. (2021) Vaccine mandates are mounting – and that's likely to impact your next trip. *The Washington Post*. Published August 17, 2021. <https://www.washingtonpost.com/travel/2021/08/17/vaccine-mandate-new-york-broadway-california/>. Accessed January 27, 2022.

Savulescu J. and Giubilini, A. (2021). Shaming unvaccinated has got to stop. We've turned into an angry mob and it's getting ugly. *The Conversation*. Published December 15, 2021. <https://theconversation.com/shaming-unvaccinated-people-has-to-stop-weve-turned-into-an-angry-mob-and-its-getting-ugly-173137> Accessed January 27, 2022.

Stieber, Z. (2021) YouTube temporarily suspends Sen. Johnson's channel over vaccine injury panel. https://www.theepochtimes.com/youtube-temporarily-suspends-sen-johnsons-channel-over-vaccine-injury-panel_4102388.html. Accessed January 27, 2022.

Shao, Wanyun, and Feng Hao. "Understanding American Public Support for COVID-19 Risk Mitigation: The Role of Political Orientation, Socio-Demographic characteristics, Personal Concern, and Experience, the United States, 2020" *International journal of public health* vol. 66 1604037. 1 Jul. 2021, doi:10.3389/ijph.2021.1604037

Shaheen, M (2022) Experts do NOT agree that Covid vaccines are necessary for children as young as five due to little risk they face from the virus and potential adverse effects of the jab. <https://www.dailymail.co.uk/health/article-10452707/Not-experts-agree-Covid-vaccines-necessary-children-young-five.html>. Accessed January 28, 2022.

Singanayagam, A., Hakki, S., Dunning, J., Madon, K. J., Crone, M. A., Koycheva, A., et al. (2022). Community transmission and viral load kinetics of the SARS-CoV-2 delta (B. 1.617. 2) variant in vaccinated and unvaccinated individuals in the UK: a prospective, longitudinal, cohort study. *The Lancet Infectious Diseases* 22(2): 18 -195.

Sprengholz, P., & Betsch, C. (2020). Herd immunity communication counters detrimental effects of selective vaccination mandates: Experimental evidence. *EClinicalMedicine*, 22, 100352.

Sprengholz, P., Felgendreiff, L., Böhm, R., & Betsch, C. (2021a). Vaccination policy reactance: Predictors, consequences, and countermeasures.

Sprengholz, P., Betsch, C., & Böhm, R. (2021b). Reactance revisited: Consequences of mandatory and scarce vaccination in the case of COVID-19. *Applied Psychology: Health and Well-Being*.

Tanveer, S., Rowhani-Farid, A., Hong, K., Jeffers, T., & Doshi, P. (2021). Transparency of COVID-19 vaccine trials: decisions without data. *BMJ evidence-based medicine*.

Tasker, J. (2021) Trudeau promises \$1B to help provinces pay for vaccine passports. See: <https://www.cbc.ca/news/politics/trudeau-promises-1b-vaccine-passports-1.6155618>. Accessed January 27, 2022.

Teh, C. (2021). A Swedish company has created a microchip that allows users to carry their COVID vaccine passport under their skin. *Insider*. <https://www.insider.com/swedish-firm-under-skin-microchip-for-covid-19-passes-2021-12>. Published December 23, 2021. Accessed January 21, 2022.

Thacker, P. D. (2021) COVID-19: Researcher blows the whistle on data integrity issues in Pfizer's vaccine trial. *BMJ*, 375.

United Nations International Covenant on Economic, Social and Cultural Rights (ICESR). (1966) Available at <https://www.ohchr.org/en/professionalinterest/pages/cescr.aspx> (date accessed 26 January 2022)

UN Committee on Economic Social and Cultural Rights. General Comment No. 14 on the Right to the Highest Attainable Standard of Health [Internet]. Document No.: E/C.12/2000/4; 2000. online: http://tbinternet.ohchr.org/_layouts/treatybodyexternal/Download.aspx?symbolno=E%2FC.12%2F2000%2F4&Lang=en

UN General Assembly. International Covenant on Economic, Social and Cultural Rights [Internet]. Adopted in Resolution 2200A (XXI); 1966. Online: <http://www.ohchr.org/EN/ProfessionalInterest/Pages/CESCR.aspx>

UK Government (2021.) Further MHRA response to the precautionary suspensions of COVID-19 Vaccine AstraZeneca. <https://www.gov.uk/government/news/mhra-response-to-irish-authorities-action-to-temporarily-suspend-the-astazeneca-covid-19-vaccine> (accessed 30 January 2022).

UK Parliament (2021.) Covid-Status Certification. [Public Administration and Constitutional Affairs Committee. https://publications.parliament.uk/pa/cm5802/cmselect/cmpubadm/42/4202.htm](https://publications.parliament.uk/pa/cm5802/cmselect/cmpubadm/42/4202.htm) (accessed 20 January 2022)

UK Health Security Agency (UKHSA). COVID-19 vaccine surveillance report week 3, 2022. (2022.) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1049160/Vaccine-surveillance-report-week-3-2022.pdf (accessed 27 January 2022)

van Dongen, T., & Leidig, E. (2021). Whose side are they on? The diversity of far-right responses to Covid-19. International Centre for Counter-Terrorism. <https://icct.nl/publication/whose-side-are-they-on-the-diversity-of-far-right-responses-to-covid-19/>

Viana, J., van Dorp, C. H., Nunes, A., Gomes, M. C., van Boven, M., Kretzschmar, M. E., ... & Rozhnova, G. (2021). Controlling the pandemic during the SARS-CoV-2 vaccination rollout. *Nature Communications*, 12(1), 1-15.

Vural, E., Herder, M., Graham, J. (2021). From Sandbox to Pandemic: Agile Reform of Canadian Drug Regulation. Health Policy. See: <https://doi.org/10.1016/j.healthpol.2021.04.018>

Ward, J.K., Gauna, F., Gagneux-Brunon, A., Botelho-Nevers, E., Cracowski, J.L., Khouri, C., Launay, O., Verger, P. and Peretti-Watel, P. (2022.) The French health pass holds lessons for mandatory COVID-19 vaccination. *Nature Medicine*, in press.

Waszkiewicz, P., Lewulis, P., Górski, M., & Feleszko, W. (2021). Vaccines and Political Divisions: An Analysis of the Attitudes Toward Vaccination and Political Preferences in Poland. *Available at SSRN 3894341*.

Wexler Medical Center. (2021) COVID-19 isn't discriminating by age — younger people are dying, too. <https://wexnermedical.osu.edu/blog/covid-not-discriminating-by-age> (accessed 27 January 2022)

Wilder-Smith, A. What is the vaccine effect on reducing transmission in the context of the SARS-CoV-2 delta variant?. (2022.) *The Lancet. Infectious diseases*, S1473-3099.

Wilf Miron, R., Myers, V., & Saban, M. (2021). Incentivizing vaccination uptake: The “green pass” proposal in Israel. *JAMA*, 325(15), 1503-1504.

Wise, A. (2021). The political fight over vaccine mandates deepens despite their effectiveness. *NPR*. Published October 17, 2021. <https://www.npr.org/2021/10/17/1046598351/the-political-fight-over-vaccine-mandates-deepens-despite-their-effectiveness>. Accessed January 27, 2022.

Wong, W. (2021). Fauci says public is 'misinterpreting' latest CDC mask guidance. *NBC News*. Published May 20, 2021. <https://www.nbcnews.com/news/us-news/fauci-says-public-misinterpreting-latest-cdc-mask-guidance-n126800>. Accessed January 27, 2022.

ZOE. (2021a) DO I need a COVID vaccine if I've had COVID? <https://covid.joinzoe.com/post/do-i-need-a-covid-vaccine-if-i-ve-had-covid> (accessed 20 January 2022).

ZOE. Vaccine after effects more common in those who already had COVID. (2021b). <https://covid.joinzoe.com/post/vaccine-after-effects-more-common-in-those-who-already-had-covid> (accessed 20 January 2022)