

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

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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. While these policies have prompted ethical, scientific, practical, legal, and political debate, there has been limited evaluation of their potential unintended consequences. Here, we outline a comprehensive set of hypotheses for why these policies may ultimately be counterproductive 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 appear to have had a significant impact on decreasing global morbidity and mortality burdens, we argue that current mandatory vaccine policies are scientifically questionable and are likely to cause more societal harm than good. 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. Current policies may lead to a widening of health and economic inequalities, detrimental long-term impacts on trust in government and scientific institutions, and reduce the uptake of future public health measures, including COVID-19 vaccines as well as routine immunizations. 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 institutions. We argue that current COVID-19 vaccine policies should be reevaluated in light of the negative consequences that we outline. Leveraging empowering strategies based on trust and public consultation, and improving healthcare services and infrastructure, represent a more sustainable approach to optimizing COVID-19 vaccination programs and, more broadly, the health and wellbeing of the public.

1. Introduction

Since 2021, mandatory proof-of-vaccination policies have been implemented and justified by governments and the scientific community to control COVID-19. These policies, initiated across the political spectrum, including in most liberal democracies, have spread globally and have involved: workplace mandates (e.g., a ‘no jab, no job’ US federal mandate); green passes/vaccine passports that limit access to social activities and 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, Canada and New Zealand); differential access to medical insurance and healthcare (e.g., Singapore); 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, Canada, 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	Canada (several provinces), 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. As of March 2022, some countries also shifted course and decided to not implement these policies due to changing epidemiological circumstances and socio-political resistance. Adapted from (1).

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 most vulnerable. This quickly shifted to vaccination thresholds to reach herd immunity and “end the pandemic” and “get back to normal” once sufficient vaccine supply was available (2-3). In late summer of 2021, this pivoted again to a universal vaccination recommendation to reduce hospital/ICU burden in Europe and North America, to address the “pandemic of the unvaccinated.”

COVID-19 vaccines have represented a critical intervention during the pandemic given consistent data of vaccine effectiveness averting COVID-19-related morbidity and mortality (4–7). However, the scientific rationale for blanket mandatory vaccine policies have been increasingly challenged due to waning sterilizing immunity and emerging variants of concern (8). A growing body of evidence shows significant waning effectiveness against infection (and transmission) at 12 to 16 weeks, with both Delta and Omicron variants (9-14), including with third-dose shots (15-16). Since early reports of post-vaccination transmission in mid-2021, it has become clear that vaccinated and unvaccinated individuals, once infected, transmit to others at similar rates (17). Vaccine effectiveness may also be lower in younger age groups (18). While higher rates of hospitalization and COVID-19 associated morbidity and mortality can indeed be observed among the unvaccinated across all age groups (4–7), broad-stroke passport and mandate policies do not seem to recognize the extreme risk differential across populations (benefits are greatest in older adults), are often justified on the basis of reducing transmission and, in many countries, ignore the protective role of prior infection (19-20).

Mandate and passport policies have provoked community and political resistance including energetic mass street protests (21-22). Much of the media and civil debates in liberal democracies have framed this as a consequence of “anti-science” and “right-wing” forces, repeating simplistic narratives about complex public perceptions and responses. While vaccine mandates for other diseases exist in some settings (e.g. schools, travel (e.g. yellow fever) and, in some instances, for healthcare workers) (23), population-wide adult mandates, passports, and segregated restrictions are unprecedented and have never before been implemented on this scale. These vaccine policies have largely been framed as offering ‘benefits’ (freedoms) for those with a full COVID-19 vaccination series (24-25), but a sizable proportion of people view conditioning access to health, work, travel and social activities on COVID-19 vaccination status as inherently punitive, discriminatory, and coercive (21-22, 26-29). There are also worrying signs that current vaccine policies, rather than being science-based, are being driven by socio-political attitudes that reinforce segregation, stigmatization and polarization, further eroding the social contract in many countries. Evaluating the potential societal harms of COVID-19 pandemic restrictions is essential to ensuring that public health and pandemic policy is effective, proportionate, equitable and legally justified (30-31). The

complexity of public responses to these new vaccine policies, implemented within the unique socio-political context of the pandemic, demand assessment.

[INSERT FIGURE 1 HERE]

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 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**). Our aim is not to provide a comprehensive overview or to fully recapitulate the broad ethical and legal arguments against (or for) COVID-19 vaccine mandates and passports. These have been comprehensively discussed by others (32-34). A full review of the contribution of mandates and passports to COVID-19 morbidity and mortality reductions is not yet possible, although some existing studies on vaccine uptake are cited below. Rather, our aim is to add to these existing arguments by outlining an interdisciplinary social science framework for how researchers, policymakers, civil society groups and public health authorities can approach the issue of unintended social harm from these policies, including on public trust, vaccine confidence, political polarization, human rights, inequities and social wellbeing. We believe this perspective is urgently needed to inform current and future pandemic policies. Mandatory population-wide vaccine policies have become a normative part of pandemic governance and biosecurity response in many countries. We question whether this has come at the expense of local community and risk group adaptations based on deliberative democratic engagement and non-discriminatory, trust-based public health approaches.

2. What can we learn from the behavioral sciences?

2.1. Reactance, entrenchment and vaccine uptake

Apart from mandatory vaccination of the elderly (planned in Czech Republic, Greece, Malaysia, and Russia), most policies do not specify individuals at higher-risk of severe COVID-19 outcomes – among whom COVID-19 vaccine uptake rates, and vaccine confidence, is very high (35-36).

Although studies suggest that current policies are likely to increase population-level vaccination rates to some degree (37-40), gains were largest in those under 30 years old (a very low-risk group) and in countries with below average uptake (37). 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. (41), including a survey by Porat et al. (42) in the UK and Israel, found that compulsory COVID-19 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 (43-44). A third experiment found that selective mandates increased reactance when herd immunity targets were not clearly explained (45) – which most governments failed to communicate adequately and convincingly as they shifted their rationale from herd immunity to hospital/ICU admission metrics. De Figueiredo et. al. (46) found that vaccine passports in the UK would induce a net *decrease* in inclination to get vaccinated among those who had not received a full vaccination dose, while Bell et. al. (47) found that UK healthcare workers who felt pressured to get vaccinated were more likely to have declined the COVID-19 vaccine. Jørgensen et al. (48) found that the reintroduction of vaccine passports in late 2021 in Denmark increased distrust among the unvaccinated. Finally, recent evidence from France suggests that the *passe sanitaire* was associated with increased vaccination but that 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: “Mandatory vaccination for COVID-19 runs the risk of politicizing vaccination further and reinforcing distrust of vaccines” (49).

2.2. Cognitive dissonance

The public interpretation of these policies has occurred within the context of the rapidly changing pandemic. Oftentimes, public announcements and media coverage have oversimplified, struggled to communicate potential adverse events (including a potentially higher risk in the convalescent) (50) and overstated vaccine efficacy on transmission. Significant public concerns about safety signals and pharmacovigilance have been furthered by the lack of full transparency in COVID-19 clinical trial data (51-52) as well as shifting data on adverse effects, such as blood-clotting events (53), myocarditis (54), and altered menstrual periods (55). These changes have been associated with changes to vaccination guidelines in terms of eligibility for different vaccines in some countries. Mandates, passports, and segregated restrictions create an environment where reactance effects are enhanced because people with low vaccine confidence see contradictory information as validating their suspicions and concerns. The pressure to vaccinate and the consequences of refusal heighten people’s scrutiny of information and demand for clarity and transparency. Current policies have likely facilitated various layers of *cognitive dissonance* – a psychological stress precipitated by the perception of contradictory information.

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” (56). Many governments originally followed with similar public statements, only to shift positions, often suddenly, in mid or late 2021 during the Delta or Omicron surge, including in Austria (the first country to announce a full population-wide mandate) (57-58). Cognitive

dissonance may have been compounded by the changing rationale provided for vaccine mandate policies, which originally focused on achieving herd immunity to stop viral transmission and included public messaging that vaccinated people could not get or spread COVID-19. Policies often lacked clear communication, justification, and transparency, contributing to persistent ambiguities and public concerns about their rationale and proportionality (59). In late 2021, however, the re-introduction of onerous non-pharmaceutical interventions (NPIs) in countries with mandates and passports perpetuated cognitive dissonance, since governments had made promises that vaccination would ensure a “return to normal” and many people (especially younger people) had vaccinated based on these announcements (37,49).

When mandate rules are perceived to lack a strong scientific basis, the likelihood for public scrutiny and long-term damage to trust in scientific institutions and regulatory bodies is much higher. A good example is the lack of recognition of infection-derived immunity in employer-based vaccine mandates and passports in North America, including most universities and colleges (60). Despite clear evidence that infection-derived immunity provides significant protection from severe disease on par with vaccination (19,32), prior infection status has consistently been underplayed. Many individuals with post-infection immunity have been suspended or fired from their jobs (or pushed to leave) or been unable to travel or participate in society (32,57-60) while transmission continued among vaccinated individuals in the workplace. This inconsistency was widely covered in Republican and libertarian-leaning media in ways that reinforced distrust not only about the scientific basis of vaccine policies but also the entire public health establishment, including the CDC.

2.3. Stigma as a public health strategy

Since 2021, public and political discourse has normalized stigma against people who remain unvaccinated, often woven into the tone and framing of media articles (61). Political leaders 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 2**). Political rhetoric descended into moralizing, scapegoating, and blaming using pejorative terms and actively promoting stigma and discrimination as tools to increase vaccination. This became socially acceptable among pro-vaccine groups, the media and the public at large, who viewed full vaccination as a moral obligation and part of the social contract (62). The effect, however, has been to further polarize society – physically and psychologically – with limited discussion of specific strategies to increase uptake especially in communities where there would be disproportionately larger individual and societal benefits. There is rarely a discussion of *who* and *why* people remain unvaccinated. Vaccine policy appears to have driven social attitudes towards an us/them dynamic rather than adaptive strategies for different communities and risk groups.

Table 2: 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” (63).</p>
Justin Trudeau, PM of Canada	<p>“When people are seeing cancer treatments 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 muscles in, and we have to make a choice, as a leader and as a country: Do we tolerate these people?” (64)</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” (65)</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" (66)</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 others to shut themselves in their homes” (67)</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” (68).</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" (69).</p>

<p>Tony Blair, former UK Prime Minister</p>	<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” (70).</p>
<p>Rodrigo Duterte, President of The Philippines</p>	<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....” (71)</p>

Leveraging stigma as a public health strategy, regardless of whether or not individuals are opposed to vaccines, is likely to be ineffective at promoting vaccine uptake (72). 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, eschewing public consultation, and over-relying on pharmaceutical company-produced data) that may prevent or delay vaccination (46-47,73-76). 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) not impact the way medical, cultural, or legal institutions treat individuals seeking care. Some governments discussed or imposed medical insurance fines or premiums on the unvaccinated, while hospital administrators considered using vaccination status as a triage protocol criterion. The American Medical Association released a statement decrying the refusal to treat unvaccinated patients (77) but this has not prevented the ongoing narrative of shaming and scapegoating people choosing not to get vaccinated.

2.4. Trust, power and conspiracy theories

Trust is one of the most important predictors of vaccine acceptance globally (78-79) including confidence in COVID-19 vaccines (73,80-81). Data show that being transparent about negative vaccine information increases trust and Petersen et al. (82) found that when health authorities are not transparent, it can increase receptivity to alternate explanations.

COVID-19 vaccine policies have the potential to erode vaccine confidence, trust and the social contract in the particular context of the pandemic, which has exacerbated social anxieties, frustrations, anger and uncertainty. By the time COVID-19 vaccine mandates were introduced, many communities had struggled

under lockdowns and other severe public health restrictions, undergone a succession of pandemic waves with changing rules that stretched public confidence in government, had their economic security and livelihoods negatively impacted and been exposed to a media-induced culture of fear perpetuated by an abundance of conflicting and confusing information. All of this occurred within the broader global trend of increasing inequities between North and South, rich and poor, as well as the erosion of trust in institutions and experts.

It is likely that many of the alternative explanations of the pandemic, often called conspiracy theories, were further entrenched when vaccine policies were forcefully implemented in 2021, creating a strong confirmation bias that governments and corporate powers were acting in an authoritarian manner. Those who resist vaccine mandates and passports are more likely to have low trust in government and scientific institutions (26-29,73-74), and these beliefs and distrust have likely grown due to the propensity of policies to justify social segregation, creating new forms of activism. Furthermore, multiple social perceptions and logics about science, technology and corporate and government power have been grafted onto the public discussion about COVID-19 vaccines, specifically related to authoritarian bio-surveillance capabilities (83). These include concerns about the adoption of implantable tracking devices (including micro-chips), digital IDs, the rise of social credit systems and the censorship of online information by technology companies and state security agencies. The COVID-19 pandemic happens to coincide with far-reaching technological advances that do provide the capability for new forms of mass state surveillance (84-85). For example, emerging biocompatible intradermal devices can be used to hold vaccine records (86), while multifunction implantable microchips (that can regulate building access and financial payments, much like cell-phones) are now available on the market (87). Aspects of vaccine passport policies (dependent on QR codes) combined with these innovations – as well as censorship by social media companies of vaccine clinical trial and safety issues from reputable sources like the BMJ (88) – have likely reinforced and exacerbated suspicion and distrust about the impartiality of public health guidance and vaccines (89). It is highly likely that reactance effects generated by current vaccine policies have increased the view that public health is influenced by powerful socio-political forces acting in the private interest, which may damage future social trust in pandemic response.

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

3.1. The erosion of civil liberties

The COVID-19 vaccine policies that we have outlined represent a broad interference with the rights of unvaccinated people. While some governments introduced mandates and passports through the democratic process (e.g., Switzerland, Austria, France), many policies were imposed as *regulations, decrees, orders,*

or *directions* under states of emergency and implemented in ways that allowed ad hoc juridical decisions and irregular and over-permissive private-sector rules, with limited accountability or legal recourse to address rights violations (59).

Vaccine passports risk enshrining discrimination based on *perceived* health status into law, undermining many rights of healthy individuals: indeed, unvaccinated but previously infected people may generally be at *less* risk of infection (and severe outcomes) than doubly vaccinated but infection-naïve individuals (90). A weekly negative SARS-CoV-2 test is often seen as a compromise in lieu of full vaccination status, but this places additional burdens (including financial) on the unvaccinated while also risking reputational damage. Employer-imposed mandates that do not provide reasonable accommodation (e.g. testing, relocation, or reassignment of duties) or that require people to be vaccinated following prior infection even where employees can work remotely, arguably constitute a disproportionate imposition of a health intervention without workplace-related justification (91). Many countries have also tightened the ability to seek religious, medical, or philosophical exemptions, open to unclear decision-making and political interference (92). 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 on the basis of documented prior infection (93). While media outlets were quick at hinting about problems in his official submission, the Minister of Immigration accepted that he had a valid test result and that he posed only a “very low” risk to the health of Australians (94). Yet, the court ruled that it was reasonable for the Minister to conclude that Mr. Djokovic's presence could “foster anti-vaccination sentiment” and thus have a negative impact on vaccination and boosters (94). It endorsed Mr. Djokovic characterization as a threat to Australian “civil order and public health” (93-94). The case underlines concerns of vaccine mandates and passports as a tool for disproportionate policy that circumvents normative civil liberties and process.

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. COVID-19 vaccine passports have normalized the use of QR codes as a regulated entry requirement into social life; in France and Israel, double-vaccinated citizens lost their ‘status’ when passports required a booster dose in 2021/22 (95-96). Technology companies interested in bio-surveillance 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 (97)

3.2. Political polarization

COVID-19 vaccine policies have generated intense political debate, mass street protests, and energized new populist movements with varied political views (21-22, 26-29, 57). Opinion polls show that while many support these policies, others view them as inherently coercive, discriminatory, disproportionate and counter to liberal values of bodily autonomy, freedom of choice and informed consent (26-29). It is clear that current policies are divisive and unpopular with many, even vaccinated people, 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. For instance, right-wing and populist parties in Germany (the Alternative for Germany, AfD), Canada (People's Party) and Austria (Freedom Party) have come out strongly against medical segregation. After implementing the world's first population-wide mandatory vaccine policy in February 2022, Austria suspended it six days before police would impose fines (max 3,600 euros), partially due to legal concerns, mass street protests and the fact that the rate of vaccination had not significantly improved (20% of adults remain unvaccinated) (57, 98). In 2022, the US Supreme Court struck down the Biden administration's federal vaccine mandate as unconstitutional (99), just as it came into effect for 80 million workers (albeit upholding the mandate for HCWs); republicans had long criticized the mandates (100-101). In Martinique and Guadelupe, vaccine passports have led to months of political unrest and violent protests that threaten the stability of the French government (49). Pottinger (102) 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 (103), 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 (104), center and 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 the 2021 federal election. The end to exemptions for unvaccinated truckers crossing the US-Canadian border precipitated the trucker "freedom convoy" protests in early 2022 in Canada, which led to weeks of protesters occupying streets outside parliament. The protest ended with the unprecedented invoking of the Emergencies Act, equivalent to martial law, which was heavily criticized by civil liberty organizations and included the freezing of protester bank accounts (105-106). In the USA, California and New York (Democrat-controlled states) have implemented COVID-19 vaccine passports for children while Florida, Georgia, 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, and business owners and employees requiring QR codes for entry have been targeted for abuse, in some cases. In turn, pro-vaccine advocates have equated anti-mandate social groups as “anti-vaxxers” and even domestic terrorists, calling for government agencies and social media companies to strengthen censorship laws. Echo chambers have skewed the reasonableness of risk assessment of some pro-mandate individuals, who now fear that unvaccinated people are “unsafe” – physically but also culturally – despite the scientific evidence. Political polarization and radicalization – both anti-mandate and pro-mandate– may increase if punitive 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 in early 2022 that boosters would prolong the pandemic by contributing to vaccine hoarding and low supply (107), universities (including global health departments) in wealthy countries have mandated boosters for low-risk healthy students and faculty (60), when vaccination rates remained low in many low- and middle-income countries (LMICs) (108). Efforts to pressure pharmaceutical companies (who developed vaccines with the support of publicly funded research money) to remove patent protections have proved unsuccessful (109-110). Pharmaceutical companies have ensured that the costs of adverse effects are borne by governments (111); in turn, the world’s tens of millions of migrants and asylum-seekers may be denied COVID-19 vaccines because of legal liability issues (112). Simultaneously, some scientists are calling the unvaccinated (as a homogenous group) the source of future variants (“variant factories”) fueling inflammatory rhetoric (113) that may have contributed to the heavily criticized reaction to close international borders to southern Africa during the spread of Omicron in late 2021. International travelers, especially from the global south, have been barred from travelling to high-income countries based on the type of received vaccine.

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 (114) and in New York State, the Excelsior Pass App-system developed by IBM will cost more than \$27 million (97). Importantly, focus on “the unvaccinated” as the cause of health system collapse diverts public attention away from global equity failures and deep structural challenges facing public health capacity in many countries. It absolves governments of attending to other strategies for opening schools and keeping public spaces safe, including improved ventilation and paid sick leave. The indiscriminate global adoption of current COVID-19 vaccine policies may also compromise national sovereignty by skewing health priorities in LMICs, taking budgets away from other important health priorities and disregarding public opinion – a new form of vaccine colonialism. Perhaps more significantly, it is possible that vaccination metrics become tied to international financial agreements and development loans and that

pharmaceutical and technology companies influence the global adoption of passport systems and mandate policies for the current but also future pandemics.

4. Socio-economic impacts

4.1. Increasing disparity and inequality

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 (73-76,78-81). This raises the possibility that current vaccine policies may fuel existing inequity (115). 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” (116). It is highly likely that mandates and passports have been 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. Moreover, communities who have historically been subject to state surveillance, segregation, structural racism, trauma, or violence may be more likely to resist medical mandates. 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 (59). Similar challenges have been raised among Europe’s Roma and in black communities in the UK and United States (46,76,117). 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 (118) and burnout in healthcare and social care workers that risk worsening clinical outcomes for all patients. These trends may be exaggerated by the current policy push towards mandatory COVID-19 vaccination of healthcare/ social care workers and firing of unvaccinated staff. The ethical arguments against these policies have been outlined by others (32, 34,119).

Despite these considerations, many countries may lose frontline staff due to mandates. By December 2021, despite the forthcoming imposition of a (later rescinded) vaccine mandate for patient-facing NHS workers, 8% of medical practitioners in the UK (73,000 people) remained unvaccinated (120). In late 2021, Quebec (Canada) dropped its proposed mandate for healthcare workers, citing the devastating labor shortage it would cause in hospital systems (3% of staff, or 14,000, were unvaccinated) (121). Both cases created

immense stress on already overburdened health staff and administrators, and were decried for their lack of clarity and clumpy policy process (122).

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 constitutional and human rights (123). 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 (124). 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 (31). 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 (125)

5. The integrity of science and public health

5.1. Erosion of key principles of public health ethics and law

Current vaccine policies may erode core principles of public health ethics. As some of those supporting mandates recognize (123, 126), and contrary to the media portrayal that “the unvaccinated are entirely free to decline”, many COVID-19 vaccine policies clearly limit choice and the normal operation of informed consent. This has placed medical professionals in an awkward position, blurring the lines between voluntary and involuntary vaccination. It is clear that many who are vaccinated did so because of the serious consequences of refusal, such as loss of employment and livelihood or access social events and travel. 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 into the future and impact the attitude of the medical profession to those who are reticent to undergo a specific medical procedure.

According to public health ethics, the principle of proportionality requires that the benefits of a public health intervention must be expected to *outweigh* the liberty restrictions and associated burdens (33). It would violate the proportionality principle to impose significant liberty restrictions (and/or harms) in exchange for trivial public health benefits, particularly when other options are available. Evidence shows that the efficacy of current COVID-19 vaccines on reducing transmission is limited and temporary (8-17), likely lower in younger age groups targeted for vaccine mandates and passports (37) and that prior infection

provides, roughly speaking, comparable benefit (19,32,90). The effectiveness of vaccine mandates in reducing transmission is likely to be smaller than many might have expected or have hoped for, and decrease over time. These issues have been widely discussed in the public arena, raising the idea that many current vaccine policies are no longer being guided by the best science but are rather being used to punish individuals who remain unvaccinated and to shape public opinion and compliance. Some governments have publicly admitted this much; in the words of French President Emmanuel Macron, the aim is to “piss off [the unvaccinated] ...to the end. This is the strategy (63).” Mandating a third dose for young boys to attend college or university in America has been widely discussed in the US media despite the lack of evidence for substantial clinical benefit (60, 127), and with evidence of small but still significant risk of myocarditis that compounds with each dose (128-130). Scandinavian countries have taken a precautionary and voluntary approach in their recommendations to the vaccination of children, with Swedish authorities stating that “[because of] a low risk for serious disease for kids, we don’t see any clear benefit with vaccinating them” (131). 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 (132).

Proportionality is also a key condition from a constitutional and human rights perspective (123, 133-134). The formal requirements of legal proportionality tests, which differ slightly depending on jurisdiction and context, generally reflect a balancing similar to the one in public health ethics. In part because of legally required restraint when it comes to assessing the reasonableness of complex policy interventions, several courts, human rights tribunals and committees, and labor arbitrators, have upheld mandates as proportionate or made statements as to their legitimacy (123). This appears to have led to a broad presumption that mandates are legally unproblematic. But a common requirement of legal proportionality is that no other rights-restricting measures are available that can reasonably achieve the key public health goal. Accommodation of the workplace, or alternatives to vaccination such as testing, should be and have often been identified by courts, tribunals and arbitrators, as being a core element of the legality of mandates (91, 123, 133, 135). Mandates imposing unconditional vaccination, those ignoring the role of prior infection, and those ignoring a shifting risk/benefit balance depending on specific populations, should be considered suspect from a legal proportionality perspective.

When members of the public perceive mandates to be ethically and legally problematic and in violation of established norms of informed consent and proportionality, this will erode trust in public health and scientific institutions and even courts that endorsed or actively promoted such policies. This presents a challenging paradox for experts and authorities: Will pro-mandate scientists and organizations come to acknowledge that mandates and passports were disproportionate policy responses? One key aspect of building trust in science and public health involves the open acknowledgment of when experts are wrong

and when policies were misguided; however, it appears that many officials have doubled-down in their narratives. This may undermine key ethical and legal criteria for policy and have damaging effects on the integrity of public health itself.

5.2. 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, preventing deaths, severe hospitalizations and long-term sequelae from SARS-CoV-2 (4-7). COVID-19 vaccines have also generated at least \$100 billion profit for pharmaceutical companies, especially Pfizer (136). Has the acceptance of mandates and passports – and the rhetoric around “anti-vaxxers” – contributed to a cultural shift in norms of scientific and corporate transparency and accountability?

Governments have refused to disclose the details of contracts with manufacturers, including for additional doses or ‘next-generation’ vaccines (109). Vaccines are typically not approved until two years of follow-up data is gathered (3), but given the urgency of the COVID-19 pandemic and international harmonization of new agile regulations, the novel mRNA COVID-19 vaccines were placed into emergency use in Europe and North America in late 2020 (137). There is concern that, in the fog of crisis, vaccine policy is being driven by vaccine manufacturers rather than independent scientific and regulatory review. 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 (127). This only adds to distrust over decision-making around vaccine use and ensuing mandates. The public is aware of the history of corporate pharmaceutical malfeasance and criminal and civil settlements in the billions of dollars, including with Pfizer, in part resulting from marketing practices and misrepresentation of safety and efficacy of medicines (51-52, 138).

The nature of mandates, passports, and restrictions has increased public demands for scientific accountability and transparency – shown to be fundamental to building long-term confidence in vaccination (139). This has increased the need to diligently track all safety signals for adverse effects in specific demographics (140) and explore trends in overall population mortality and potential non-specific effects (141). However, the original clinical trial data remain unavailable for independent scientific scrutiny (51-52); 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 (142). After a FOIA request by a civil society group (see: <https://phmpt.org>), the US Food and Drug Administration (FDA) requested (ultimately denied by a federal judge) 75 years to fully release internal documents and communications related to the

regulatory process between FDA and Pfizer. In September 2021, an FDA advisory committee voted 16-2 against boosting healthy young adults in the United States but was overridden by the White House and CDC, leading to the resignation of two top FDA vaccine experts (127). Such efforts have only increased the perception that regulatory agencies are “captured” by industry and would conveniently ignore a higher than usual adverse effect ratio to control the pandemic. Concerns have been raised about the lack of due process in vaccine injury compensation claims for the COVID-19 vaccines (110), which are to be borne by governments and not 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 (88-89, 143). 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 policies has provoked backlash, resistance and polarization. It is important to emphasize that these policies are not viewed as “incentives” or “nudges” by substantial proportions of populations (42,46,26-29) especially in marginalized, underserved, or low COVID-19-risk groups. Denying individuals education, livelihoods, medical care, or social life unless they get vaccinated—especially in light of the limitations with the current vaccines—is arguably in tension with constitutional and bioethical principles, especially in liberal democracies (31-34). While public support consolidated behind these policies in many countries, we should acknowledge that ethical frameworks were designed to ensure that rights and liberties are respected even during public health emergencies.

Vaccination policies can be an important tool in the promotion of the right to health, but they need to be proportionate and designed to achieve a clearly defined goal. Some of those supporting current restrictions based on vaccination status (126) seem to accept too easily that these measures are indeed proportionate; that they are not more restrictive than necessary; 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. As illustrated above, 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 assess the benefits and harms of COVID-19 vaccination policies, along with wider open multidisciplinary discussion and debate. Empiric 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 policies affecting those who remain unvaccinated as well as those who vaccinated due to threats

and pressure. COVID-19 will not be the last public health emergency and it remains critical that we understand the reasons these approaches were adopted and provide robust evidence to improve future policymaking in times of health emergencies (144). If not, the proclivity for mandates, passports, restrictions, fines, and punishments are likely to become an accepted policy response for the next pandemic irrespective of whether such policies are truly effective, ethical and socially harmful.

If current policies are to continue, public health associated bureaucracies and society will have to increase coercion to address current and future resistance and, in the process, come to leverage strategies more consistent with policing than public health. We may also see political forces double-down and use people who have chosen not to get vaccinated as a collective, psychological and political tool to scapegoat and reinforce a false notion of safety among vaccinated people as they yearn to resume social and economic life. 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 – behaviorally, politically and socio-economically – as well as the impact of such policies on the integrity of science and public health itself.

There are other options to address the pandemic and it is not too late to return to non-coercive public health measures, including pro-social language and community leadership for vaccination, especially to protect high-risk groups (8). Future investments in public health capacity, especially health providers who build relationships of trust working in communities, will be essential to engage in positive reforms. Improving data transparency, media independence and broad public debate and scrutiny about COVID-19 vaccine policies will also 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.

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

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