SUMMARY. There was plenty of well-tested public health knowledge about virus control long before COVID-19. We had a good sense of the strengths and limitations of surveillance, information sharing, rapid case finding and contact tracing, quarantine and isolation. For many reasons — including the characteristics of the SARS-CoV-2 virus, the attempts by Chinese local officials to suppress information, and the deliberate reduction of U.S. public health capacity — this approach was rapidly overwhelmed, thrusting the United States (and most of the world) into the far less familiar territory of trying to stop large-scale community spread. Leaders used emergency authority to throw up barriers to viral transmission, from stay-at-home orders to mask wearing, often in apparently haphazard combinations. It would have been possible to draw on expert knowledge and evidence of the use and effects of similar measures in long-ago epidemics of polio and influenza, but we see little evidence that decision makers did so, let alone that they benefited from existing scientific knowledge about law and human behavior in selecting and deploying new interventions. Although hundreds of researchers jumped to assess initial measures, the effort to quickly model, rather than painstakingly measure, the effects of policy, shortcutting peer review, and feeding research directly to the press and social media may have done more than harm than good. The predictions were not good enough, and have not helped us untangle the effects of policies alone or in combination. Looking forward, we hope that new leadership will bring a broader range of existing theory and expertise to bear in fashioning national guidance for COVID-19 control. We recommend significant investment as soon as possible in research assessing the deployment and effects of the emergency measures we are deploying, which in the long term can instigate and guide reform of emergency public health laws and their implementation in future pandemics.

Introduction

Our assessment of how law was working as a tool for reducing the spread of COVID-19 in Volume 1 began with theory. Understanding how law usually works to change behavior and environments is essential to selecting plausible control strategies and interpreting the results of the earliest research. For more information, please see Chapter 2 in Assessing Legal Responses to COVID-19: Volume I (Anderson & Burris, 2020). The early research we reviewed in early summer 2020 consisted of simple correlations of legal strategies and trends in COVID-19 disease, and more ambitious and complicated modeling studies. Both kinds of analysis were coming out quickly, often spreading as “working papers” before the completion of peer review or formal publication. Looking at the evidence as it was, we reached four conclusions:

- “Traditional” epidemic control measures of case-finding and individual control could work for COVID-19 provided they were properly and timely implemented.
- Population-based physical distancing measures such as business closures, stay-at-home orders and gathering bans could suppress transmission while they were in effect, but we knew very little about what combinations or stringency or enforcement elements were necessary or sufficient for impact.
- Universal mask-wearing looked effective in reducing transmission rates, but mandating it in the United States posed a serious implementation challenge, first because of initial contrary advice, and then because of its transformation into a symbol of political affiliation.
- Legal measures to control COVID-19 have not prevented and may have contributed to significant racial disparities in U.S. infections.

In this update, we consider the future of COVID-19 control (and public health law research on pandemic control) from the standpoint of legal epidemiology. We have long argued that rigorous public health law research should figure more prominently as a guide to — and check on — policy. We have also recognized that laws are often made in response to new threats, when policy just cannot wait for specific evidence. In cases like that — in cases
like COVID-19 — we have pointed to the usefulness of existing research knowledge and theory in developing new policies, and the importance of “catching up” with evaluation research as quickly as possible. COVID-19 has shown how important — and hard — it can be to follow this advice.

**Where We Stand Today: The Old Evidence and Expertise Is Still the Best Evidence and Expertise**

It requires no empirical validation to assert that competent and engaged leadership from the president and the federal government is indispensable. Its absence — and the malign efforts of the president to undermine control efforts — would probably have been enough on its own to prevent a successful response (Wright, 2021). We assume that henceforth we can count on minimal competence and a sincere desire to help at the federal level. The research from the past year supports only tentative causal inference, so the following observations about “what works” in legal controls of the virus are offered with an explicit caveat emptor.

**Social and Political Limitations Are Intrinsic Elements of Intervention Effectiveness**

When we ask what measures “work,” or whether governments are doing a “good job,” it is important to emphasize that there is no meaningful assessment of COVID-19 control measures outside their specific social context. Resistance to measures like social distancing, mask requirements, and travel controls has been seen throughout the world. The usefulness of any control measure depends not on its potential effectiveness under optimal conditions but rather on its functioning and effects in the typical conditions of real life. Social factors are also crucial to understanding failures of intervention timing: repeatedly, we have seen important controls come too late in an epidemic wave, be removed too soon, or both. It seems to be a common feature of pandemic response that the social and political conditions necessary to adopt or sustain a painful control measure will not be present at the time the measure would be most effectively deployed. This “Pandemic Control Paradox” suggests that the overarching legal evaluation question ahead of us is not whether particular measures can work if timely adopted with adequate resources, but whether and under what circumstances societies are capable of investing in capacity and accepting in time that action is required.

**The United States Currently Lacks the Capacity to Control an Outbreak of Readily Communicable Disease through Traditional Case Finding and Control Methods Alone**

In early 2021, the United States is further than ever from a level of infection that can be managed by traditional control measures alone. Events show that efficacy of those measures is a function of capacity and implementation. Underfunded and ill-prepared health systems, using poor data systems, unsupported by clear, consistent, and vigorous federal guidance and messaging, are quickly overwhelmed. State and local governments urgently need CDC expertise and funding to increase their capacity to identify and disrupt outbreaks, while implementing vaccination campaigns. Without that, we can best regard traditional control measures as a relatively weak component of the “layered” approach, to which we turn next.

**The “Swiss Cheese” Approach Can Work, but Lack of Expertise and Evidence Has Hampered Its Effective Use and Reduced Policymaker and Public Confidence in the Face of High Costs**

Like most of the rest of the world, the United States has settled into a layered (or “Swiss cheese”) approach to control. In this model, multiple interventions like mask requirements and physical distancing are combined to minimize viral transmission. This approach is supported by some evidence and long-ago experience from polio and influenza control (Bootsma & Ferguson, 2007; Markel et al., 2007). As we concluded even six months ago, these measures can suppress COVID-19 transmission.

The layered approach is forgiving of evidentiary uncertainty and implementation problems. The combination of enough imperfect layers can control outbreaks if the layers are adopted early, broadly, and for a period long enough to substantially suppress community transmission. On the other hand, layering by definition means more things for people to object to, and so may heighten the political and social resistance problem. The lack of evidence on how individual layers work and interact can feed disputes about tradeoffs and alternatives, such as whether closing bars and businesses makes it safe to open schools. In the United States, the spring of 2020 turned out to be the high-water mark of the layered approach, with most states imposing multiple layers of strict control for several weeks or months. Overall, these measures were associated with success in “flattening the curve.” Consistent with the Pandemic Control Paradox, some states removed restrictions when rates were still climbing, and many, if not most states were too slow to reaply control layers as infection rates began to climb again.

This failure has many authors, but we want here to focus here on how the problems with multi-faceted pandemic response can usefully be addressed in the future as problems of evidence. Three broad kinds of research and expertise can help policymakers escape the jaws of the Paradox.

First, the selection and design of the layers can be better informed by evidence and expertise on the human factors in pandemic control (Sgaier & Saldanha, 2020). Past research, including a shelf of excellent outbreak histories on U.S. pandemics like cholera, smallpox and influenza, plus a credible literature and repeated experience in public health communication, shows that human beings will react to pandemics and control measures in human ways that reflect their socio-economic, cultural, and political standpoints. Anti-vaccine sentiments and Black mistrust based on medical racism are well-recognized examples in the news now, but nearly all behavioral recommendations in public health run into social and psychological complications that decades of research has worked to explain and address. Similarly, why people obey the law is one of the better-studied domains in sociolgal research. We know a great deal about health communication, and even the social-psychological mechanisms of political polarization, yet evidence and expertise in these areas seem to have rarely been enlisted in control planning or implementation.

Second, it will help next time to have specific evidence on the relative costs and benefits of individual layers and combinations of layers. This knowledge can help policymakers pick restrictions
to impose and give them the confidence to stick with them in spite of resistance. For example, all places where people congregate do not present the same risk, and, more importantly, places are just one component of a more complex transmission system comprised of networks of people with varying socioeconomic status moving through the world. An independently owned grocery store in the Bronx may simply, by virtue of its size, who comes there, how often, and how long they shop have a very different role in community transmission than a Whole Foods in suburban Westchester County (Chang et al., 2021). It is possible, maybe at this point we can say likely, that allowing schools to continue to operate in-person is a net positive when both costs and pandemic control are considered, but only if other settings, like restaurants and bars, are shut down (European Centre for Disease Prevention and Control, 2020; Fisher et al., 2020).

Finally, inattention to structural inequality, and lack of legal epidemiology research and expertise on how law sorts people to poorer health outcomes based on their social position, was part of the reason that equity has been more a matter of talk than action in the COVID-19 response. The failure to center equity has been a tragedy in moral and practical terms. It was obvious from the start that some people would be more vulnerable because of their jobs, their living conditions, and their economic precarity. The CARES Act was a down-payment on addressing some of these issues, but nothing like a long-term solution. As summer waned into fall, the lack of congressional action to help economically stressed Americans not only made their lives harder, but very probably increased the intensity of resistance to layered controls. Without determined and deliberate action, most response measures will have disparate impact or even aggravate disparities. This leads to our next conclusion.

**Socioeconomic Inequality Is at the Root of Our National Vulnerability, But Remains Far from the Center of Our Legal Response**

The importance of social context to understanding control measures is seen in the disproportionate toll that COVID-19 and the control measures deployed have taken among poorer people and people of color in the United States (Abrams & Szefler, 2020). This disparity is just a downstream manifestation of upstream problems. Our national vulnerability to the spread of the virus, including our vulnerability to leadership and infrastructure failures, should be acknowledged as symptoms of growing inequality. Institutions and services geared primarily at poor and otherwise marginalized people were already starved of resources or shut down altogether. In contrast, societies with less socioeconomic inequality invest more in their people, suffer fewer social ills, have higher levels of social trust, and have better governance. Disparities will continue to plague the U.S. experience of COVID-19 unless and until the avoidance of disparate impact and the amelioration of structural inequality and racism become explicit drivers of control policy.

**Legal Epidemiology Moving Forward**

As the national research establishment faced COVID-19, the National Institutes of Health pumped more than $3.6 billion into biomedical research. The Gates Foundation added $350 million. But, at a time when hundreds of thousands of lives, the development of millions of children, and billions of dollars in economic activity all depended on questions about control measures, enforcement methods, the organization of the health system, and the many ways law was immediately influencing vulnerability and resilience, little to no money was directed toward public health systems research and legal epidemiology.

Neglect of law in health research is nothing new. Between 1985 and 2014, NIH funded just $10 extramural research grants on the health effects of laws or enforcement practices—less than 0.25% of all funded grants (Ibrahim et al., 2017). It is past time that the organizations and leaders running health research appreciate that law is more like pharmaceuticals than they imagined—laws are treatments applied to millions of patients for years and years, and their many effects can and should be understood better and sooner. Like all health research, legal epidemiology requires an infrastructure that starts with doctoral and post-doctoral training and assures the stable, long-term support necessary to make a good career doing good science. It requires professional organizations to serve as homes for sharing research and promoting better methods and theories.

Waiting for a pandemic to start is not a good way to do basic legal epidemiology. Rapid response research, particularly modeling, has turned out to be less helpful and potentially more disruptive than we might have wished. For example, a paper in published in *Nature* in June 2020 claimed to show that complete lockdowns—and not social distancing, self-isolation, school closures, or public events bans—were mostly responsible for flattening curves in Europe in the spring (Flaxman et al., 2020). The paper was widely reported and apparently influential, unlike a generally ignored critique published six months later that revealed problems in the measurement and modeling of variables striking at the heart of the findings (Soltesz et al., 2020). That is water under the bridge, but now is the time to invest in the research and research infrastructure to learn what we need to know for the future. To unwind the Paradox of Pandemic Control, and fully understand how legal factors influenced COVID-19 and the control response, we need a significant investment of research talent and funding. In this section, we identify a set of important legal epidemiology research questions that should be answered.

**Questions about the Legal Infrastructure**

The United States has a complex multi-level federal public health system built out of law. The set of legal jurisdictions, powers, and limitations has never been extensively or systematically studied as a factor in system performance. In the wake of a glaring breakdown of that system, it is the right time to figure out how that breakdown happened and what changes beyond leadership and luck will help it perform better in the future across all health threats and functions. The research agenda includes how the current powers, duties, and organizational status of federal health agencies influenced the coordination and support of local, state, and federal health agencies. Similar research is needed on the legal organization of local and state public health systems. We have evidence at the
local level, for example, that health departments with independent policymaking boards of health are more effective than those without. What other structural features determine agency effectiveness at the local and state level? For all these agencies, analysis of legal structural characteristics will have to incorporate the mediating influence of funding.

Public health systems are large and slow to change, but the pandemic provides both a stress test and an opportunity for action beyond COVID-19 and emergency response. The big and obvious failures related to COVID-19 tests, shortages of personal protective equipment, and contact tracing have much to say about the daily operation of public health infrastructure in controlling obesity, road injury, and other harms. Central to this agenda, as discussed in other chapters, is the study of the flow of information and the impact of legal “frictions,” like privacy law, that may limit beneficial and low-risk data uses and sharing.

Finally, research on what public health “means,” including research in the “law and society” tradition, is sorely needed to get at drivers of health system finance and operation. This kind of research will also inform broader understanding of public attitudes toward control interventions, and why elected officials and public health officials were so often unwilling or unable to effectively build broad support for the specific measures to which we turn next.

Questions about Legal Interventions

Knowing what works in a social context will be crucial to controlling future threats. As illustrated well by COVID-19, efforts to address particular health threats rarely involve only one law, and laws are only one mode of intervention. The layered response to COVID-19 has included many different kinds and variations of emergency rules, and regulations have been accompanied by public education and economic support interventions. With time, money, and talent, research can go some way in untangling the effects of the individual response elements or combinations of elements. With granular data on the frequent changes in policy details, across many jurisdictions, and with better data on outcomes like infection and mortality, these natural experiments in COVID-19 control can yield considerable insight into pandemic control.

Using law effectively will require basic research on how law works (the mechanisms of legal effect) including research that tests generic mechanisms like deterrence (possibly in randomized controlled trials). This kind of research will look at the human factors that determine whether people see control measures as collective protective action or arbitrary violation of civil rights. It will explore how and to what extent supportive policies like the Paycheck Protection Program influenced attitudes and compliance. It will look also at implementation, and how it differed in different places and with differing levels of resources and leadership support.

Questions about Law as a Fundamental Determinant of Health

As Sandro Galea explains in his introduction, good health over the course of life depends largely on access to the resources that support good health and protect against stressors that produce poor health. These “fundamental social causes” of disease influence multiple disease outcomes, through multiple risk factors, by shaping access to key resources and reproducing inequality through intervening mechanisms (Phelan et al., 2010).

Law is both a force that shapes social institutions and hierarchy, and one of the mechanisms that sorts people to different health experiences and outcomes based on their social status. The list of important questions posed by COVID-19 could well start with assessment of whether and to what extent places with different policy characteristics (from the size of the minimum wage (Van Dyke et al., 2018) to the ideological character of its governance (Montez et al., 2020)) had measurable differences in the course or severity of the pandemic. The unprecedented individual payments in the CARES Act and its successor amount to a natural experiment testing the potential impact of a universal basic income policy.

The research agenda moving forward must include research on how seemingly neutral systems treat people differently based on race or socioeconomic position. Studies could look at lack of mandated vacation, childcare, and paid sick leave; low wages; and the behavior of for-profit nursing homes and non-profit (yet bottom-line oriented) hospital systems. Existing regulatory schemes at the state and federal level in areas like occupational health and safety and nursing homes should also be examined as sources of poorer or disparate outcomes. The question of how social inequality and racism influence the policymaking and implementation process is also acute; somehow the fates of meatpacking workers and prisoners trapped in COVID-19 incubators has not stimulated protective legal action, and good research can make it harder to avoid the obvious conclusions and remedies. And lest any reader conclude that research on social determinants of health is just about the health of the poor and marginalized, COVID-19 may well end up illustrating yet again that even the best-off citizens suffer poorer health outcomes where social inequality is high (Emanuel et al., 2020).

Conclusions

Events, and early evidence, continue to suggest that a combination of control measures can suppress COVID-19 transmission. Unfortunately, pandemic response failed to draw on existing evidence and expertise on social determinants of health and the human and social responses to disease and disease control. The world has been rightly impressed by the success of biomedical research in developing effective COVID-19 vaccines in months rather than years. This achievement validates the public’s investment in supporting research over decades, because the development of a COVID-19 vaccine was not the work of a year. Developers of the vaccine were building on decades of basic science, particularly in genetics. It bears mentioning, too, that researchers in both academe and commercial pharma were equipped with first-rate labs and computers, and plenty of well-trained and well-paid colleagues with well-built career paths to draw on for information and support. Comparable investment and infrastructure have been sorely lacking in legal epidemiology.

The failure to appreciate that law and other social factors can be understood scientifically, and more importantly that the insights provided by science can be used to design and implement policy,
has contributed to the overall dismal record of COVID-19 control. Policy will always be political, and systems comprised of human beings will exhibit frustratingly irrational, selfish, and self-harming behavior. Better research and theory will not change that, but they remain essential tools in the fight for rational, humane, equitable, and effective health policies.

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**Recommendations for Action**

**Federal government**

- Congress, via the National Institutes of Health, the National Science Foundation or otherwise should launch a major, long-term initiative to support scientific research on the health effects of law and legal practices, starting with the impact on COVID-19.
About the Authors

Evan Anderson, JD, PhD, lectures in health policy and public health law in the School of Nursing and in the MPH Program at the University of Pennsylvania. He was formerly the Senior Legal Fellow at the National Program Office for Public Health Law Research (PHLR), an RWJF-funded academic center based at Temple University Beasley School of Law. At PHLR, his work focused on empirical evaluations of the effect of law on population health. Anderson was previously a faculty member at the Johns Hopkins Bloomberg School of Public Health and Senior Fellow at the Centers for Law and the Public’s Health: A Collaborative at Johns Hopkins and Georgetown Universities. At Hopkins, his projects explored the balance between government authority in promoting health and individual rights in contexts including emergency preparedness and infectious disease.

Scott Burris, JD, is Professor of Law and Public Health at Temple University, where he directs the Center for Public Health Law Research. His work focuses on how law influences public health, and what interventions can make laws and law enforcement practices healthier in their effects. He is the author of over 200 books, book chapters, articles, and reports on issues including urban health, HIV/AIDS, research ethics, and the health effects of criminal law. He has been a visiting scholar at RegNet at the Australian National University, the Center for Health Law at the University of Neuchatel, the Department of Transboundary Legal Studies at the Royal University of Groningen, and a Fulbright Fellow at the University of Cape Town. Burris earned a law degree from the University of Nebraska College of Law. He is an Honorary Fellow of the Faculty of Public Health Section Lifetime Achievement Award and American Public Health Law Association Health Law at the University of Neuchatel, the Australian National University, the Center for Public Health Law Research. He is the author of over 200 books, book chapters, articles, and reports on issues including urban health, HIV/AIDS, research ethics, and the health effects of criminal law. He has been a visiting scholar at RegNet at the Australian National University, the Center for Health Law at the University of Neuchatel, the Department of Transboundary Legal Studies at the Royal University of Groningen, and a Fulbright Fellow at the University of Cape Town. Burris earned a law degree from the University of Nebraska College of Law. He is an Honorary Fellow of the Faculty of Public Health Section Lifetime Achievement Award and American Public Health Law Association Health Law at the University of Nebraska College of Law.

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