Review

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When Claims of 'Revisionism' and 'Misinformation' are Themselves Misinformed: Implications for Policy Decision-Making

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Abstract: A recent publication defined lockdown "revisionism" as "the spread of misinformation on lockdowns and other public health measures." We used this publication to analyze the claim that questioning lockdowns or other public health interventions and mandates amounts to lockdown "revisionism" and "misinformation". We suggest that the term 'revisionism', like the term 'misinformation' contained in its definition, were merely labels used to denigrate evidence-based contrary conclusions so as to avoid having to critically appraise the best evidence itself. We aim to describe how, by glossing over topics without fully engaging with the best evidence available, the assertions made do not withstand critical scrutiny. We suggest that, to ensure lessons are learned for the future, we must be willing to engage in rigorous and open debate – calling reasonable critical scrutiny of evidence 'misinformation', 'disinformation', or 'revisionism' is not supportive of this goal. Finally, we suggest that a main lesson from the COVID-19 pandemic is not to have an increased focus on so-called 'misinformation' and 'revisionism', but rather to re-discover the emergency management process of making decisions that ensure multidisciplinary representation, transparency, cost-benefit analyses of courses open using the best evidence available, and that protects against censorship and groupthink.

Keywords: COVID-19; disinformation; emergency management; lockdown; misinformation; public health; revisionism

Introduction

Lockdown "revisionism" has been defined as "the spread of misinformation on lockdowns and other public health measures" (Murdoch and Caulfield 2023). We are concerned that the term 'revisionism', like the term 'misinformation' contained in its definition, are merely labels used to denigrate evidence-based contrary conclusions so as to avoid having to confront and critically appraise the best evidence itself. Framed in this way, authors risk being accused of engaging in the very lockdown revisionism they so desire to regulate and censor. Here we aim to use a recent publication by Murdoch and Caulfield (2023) claiming 'lockdown revisionism' to describe how, by glossing over topics without fully engaging with the best evidence available, many assertions made do not withstand critical scrutiny. At least that is one area of agreement between us and Murdoch and Caulfield: "people everywhere should be armed with the critical thinking and media literacy skills necessary to see through the noise" (Murdoch and Caulfield 2023).

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Analysis of the claims

"Lockdowns"

The term 'lockdowns' was asserted to be framed as a false binary, since measures varied in severity and "attempted to strike a complex balance" - specifically, a meta-analysis was said to be "less convincing than comparative assessments of health measures, like the Oxford Stringency Index" (Murdoch and Caulfield 2023). These are puzzling assertions. The meta-analysis referenced was version 1, and the revised version 2 has responded to critiques (Herby et al. 2022a, 2022b). The meta-analysis included studies that used a difference-in-difference methodology to determine the effect of lockdown stringency (according to the Oxford Stringency Index) on COVID-19 mortality (Herby et al. 2022b). The conclusion from 8 studies was that "the average lockdown in EU and US in spring of 2020 only reduced COVID-19 mortality by 3.2%," translating into approximately 6000 and 4000 avoided deaths (compared to 72000 and 38000 influenza deaths each year, i.e., 9% of an average influenza season) (Herby et al. 2022b). That is, the meta-analysis found "little evidence that stricter lockdowns had a noticeable impact on COVID-19 mortality" (Herby et al. 2022b). If we consider that in 2019 there were 58,394,000 deaths worldwide (United Nations 2020) and over 3.5 years (from Jan 9, 2020 to July 9, 2023) there were 6,950,529 COVID-19 associated deaths recorded by the WHO (WHO, 2023), a crude (and conservative) calculation suggests that SARS-CoV-2 accounted for 3.29% of worldwide deaths, such that if lockdowns prevented 3.2% of these, lockdowns prevented 0.105% of deaths worldwide.

Many other studies have also found that stricter lockdowns were not associated with a significant effect on COVID-19 cases or mortality in the community (Joffe and Redman 2021c). This includes a study in Canada that concluded "the minimal association [with stringency] in the first wave, and the lack thereof in the second, is compatible with the hypothesis that NPIs do not, per se, lead to decline in case growth" (Vickers et al. 2022). Lockdowns were based on the flawed assumption that if complete stoppage of social interactions can prevent spread, then incomplete stoppage of social interactions can also do so (Allen 2023). Lockdowns could not stop social interactions, and likely moved them to contexts where increased spread would occur (e.g., multigenerational homes, so-called 'essential' businesses, waiting rooms, lineups, nursing homes, etc.). Central planners could not adjust mandates to specific contexts, which individuals do based on their own risk thresholds and contexts (i.e., people adjust their behavior endogenously) (Henderson 2022).

The Great Barrington Declaration

The Great Barrington Declaration (GBD) was asserted to "ha[ve] been scientifically discredited" (Murdoch and Caulfield 2023), referring to a paper by Caulfield and colleagues, where discredited seemed to mean being argued by a "small, vocal, and heavily publicized coalition of scientists with prestigious credentials and prominent government advisors," who "introduce controversy on uncontroversial topics… misinformed opinions… [including] unscientific ideas… [that have been] countered by others as a false option" (Zenone et al. 2022). This claim was based on assertions that the GBD had proposed "natural herd immunity" [defined as when "community-acquired infections in low-risk populations are used to protect high risk populations from infection"] was said to be "condemned by most public health institutions and academics," and the "death toll would be intolerable and overwhelm healthcare systems," it is "impossible to control the spread of the virus to certain low-risk populations," it "isn't clear who is at higher risk" (for example, "young people may get a persistent illness"), that it is "not possible or ethical to segregate certain populations to protect them," and that Sweden's mortality and infections are higher than in other similar locales (Zenone et al. 2022). We do not believe the GBD has been "scientifically discredited" at all, and each of the above assertions was not evidence-based.

Critical scrutiny requires engaging with debate, not simply labeling it 'uncontroversial' or 'misinformed', nor claiming victory based on who speaks the loudest or longest. The original strain of SARS-CoV-2 had median infection fatality rate (IFR) for people under 70 years old of 0.095%, ranging from 0.0003% for people 0-19 years old, to 0.506% for people 60-69 years old (Pezzullo et al.

2023). This IFR suggests that SARS-CoV-2 in younger people was unlikely to be "intolerable and overwhelm healthcare systems" (Zenone et al. 2022). It was clear that SARS-CoV-2 "rarely kills children, even compared to influenza" (Bhopal et al. 2020). It was clear very early on that those at higher risk were older people (especially aged 70 years and older, where in the community the median IFR was 2.2%) (Axfors and Ioannidis 2022), particularly those with multiple co-morbidities (including obesity, diabetes, and others) (Erdmann et al. 2021). The risk of long-COVID has been exaggerated by studies of poor methodology, often without control groups, and usually based on any of over 200 symptoms, each of unclear severity, that can be continuous, intermittent/relapsing, or new, occurring at least 12 weeks after any SARS-CoV-2 infection (Joffe and Elliott 2023). In children it is not clear whether long-COVID exists at all, as meta-analyses of studies with control groups show (Behnood et al. 2022; Joffe and Elliott 2023; Lopez-Leon et al. 2022). It is odd to argue that isolation of older people would have been unethical while at the same time to argue that isolation of the entire population was ethical. Besides, focused protection of older people could have been voluntary, and without "segregation". Regarding Sweden, it is now evident that excess mortality during the pandemic was among the lowest in the World, vindicating their approach (Eurostat 2023). Many ideas for how to protect older people while not mandating lockdowns (of varying severity) have been offered, including by the authors of the GBD (Bhattacharya et al. 2020). Finally, "absence of elimination should not be confused with the absence of herd immunity," as it is recognized that "for pathogens [e.g., RSV, influenza, seasonal Coronaviruses, SARS-CoV-2] where immunity from infection or vaccination is relatively ineffective at preventing subsequent (re)infection, accumulation of immune individuals results in the development of an endemic equilibrium… such pathogens continue to circulate, often mutate, and (re)infect members of the population whose immunity wanes over time" (Bullen et al. 2023). Indeed, erosion of this endemic equilibrium by immunity debt occurred due to interruption of transmission of endemic infections during the SARS-CoV-2 pandemic (Bullen et al. 2023; Cohen et al. 2023). For more detailed evidence on all of the above, the Norfolk group has addressed the best evidence better than we can do in the limited space here (Bhattacharya et al. 2023).

Graso et al have suggested that the public had a "miscalibration of risk" perception that was "driven by fear or based on unfounded or inaccurate facts", suggesting "a significant health communication failure" (Graso et al. 2023). This was based on documented findings that people's estimation of risks was disproportionately higher than best evidence, and that people ignored the benefits of natural immunity and that vaccinated individuals could acquire and transmit infection (Graso et al. 2023). This miscalibration of risk perception resulted in scapegoating (i.e., blaming a group unfairly for an undesirable outcome), moralization (i.e., lowered moral outrage in response to costs resulting from NPIs as opposed to equal costs from other interventions), and support for the new normal (Graso 2022; Graso et al. 2021, 2023). Overall, the suggestion was to "confront all misinformation with equal rigor and hold media and public health figures accountable for educating rather than 'shocking' their constituents into compliance…" (Graso 2022).

Cost-Benefit Analysis

We agree that "not every measure was implemented ideally in terms of its costs versus benefits. Competing priorities… created spaces for reasonable disagreement" (Murdoch and Caulfield 2023). However, we do not agree with assertions that follow that statement, which we believe misrepresent arguments and claim victory for public health interventions. We believe no adequate cost-benefit analyses were done or communicated transparently to the public.

First, it was asserted that there is "incontrovertible evidence that they [vaccines] have prevented many millions of deaths worldwide" (Murdoch and Caulfield 2023). This was based on a mathematical modelling study of COVID-19 mortality (Watson et al. 2022). In other words, with the modelling assumptions that vaccine prevents death and transmission and that there is a high IFR, and without consideration of costs (e.g., adverse events), one can obtain the desired result. However, mathematical models repeatedly failed to accurately predict cases and deaths during the pandemic (Foster and Frijters 2023; Ioannidis et al. 2022). While some of us would argue that COVID-19 vaccines

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have been important to protect against severe disease in those at high risk of adverse outcomes, much data suggests that this vaccine efficacy (VE) effect size has been exaggerated. The mRNA vaccine RCTs were not large enough nor designed to determine VE on rates of infection, transmission, hospitalization, mortality, or rare adverse events (Doshi 2020). The mRNA vaccine RCTs did not find VE on all-cause mortality, and the absolute risk increase in serious adverse events of special interest was higher than the risk reduction for COVID-19 hospitalization (Benn et al. 2023; Fraiman et al. 2022). In the pivotal Pfizer mRNA vaccine RCT most clinically suspected symptomatic infections were not even tested (i.e., not considered cases in order to contribute to the VE calculation) (Polack et al. 2020). In all VE studies that we are aware of, the first (usually 14) days after vaccination were considered 'non-vaccinated' days, a misclassification bias that can be shown to make even a placebo vaccine appear highly effective (El Gato Malo 2022a; Fenton and Neil 2023; Fung et al. 2023). Using some real-world data and correcting for this error can be shown to make VE for severe outcomes disappear (Neil et al. 2022; El Gato Malo 2022b). In all observational studies we are aware of, selection bias, especially the healthy vaccinee effect (i.e., healthier, more health-conscious people obtain vaccine) may have been critical, as suggested by studies that found VE against *non-COVID* mortality was over 50% (Hama 2021; Watanabe and Hama 2022; Xu et al. 2023), and as high as 95% (Hoeg et al. 2023d). As in influenza vaccine studies, adjusting for many potential confounders may not correct for this healthy vaccinee bias (Simonsen et al. 2007; Remschmidt et al. 2015).

The phenomenon of original antigenic sin (where the vaccinated cannot mount an adequate immune response to new variants) is another concern, and may account for studies that find negative VE for symptomatic infection over time (Aguilar-Bretones et al. 2023; Chemaitelly et al. 2023; Altarawneh et al. 2022; Lin et al. 2023), for the finding in studies of employees at the Cleveland Clinic of an increased risk of COVID-19 associated with an increasing number of previous vaccines received (Shrestha et al. 2023a), and of lower risk of COVID-19 in those not being 'up-to-date' on COVID-19 vaccination (i.e., having had at least one dose of a bivalent vaccine) (Shrestha et al. 2023b). Overall, non-replicating vaccines for respiratory viruses (such as SARS-CoV-2, without a viremic phase of systemic spread) were known, prior to this pandemic, to be non-sterilizing, to have little effect on transmission, to have waning efficacy over time, and to require RCTs to determine VE for important outcomes (Bullen at al. 2023; Yewdell 2021; Morens et al. 2023a, 2023b). Intramuscular vaccine cannot efficiently induce upper respiratory tract IgA responses, important in the early response to upper respiratory tract viral infection (Morens et al. 2023a). Meta-analysis of observational studies on VE, not correcting for the biases discussed above, found that VE against symptomatic COVID-19 for the Delta variant waned from 79.6% at 1 month, to 58.5% at 6 months, and to 49.7% at 9 months, and this was worse for the Omicron variant, waning to 14.3% by 6 months, and with similar waning after a booster dose (Menegale et al. 2023). The VE against infections cannot be estimated accurately, as asymptomatic infections "have a different degree of underreporting due to preferential testing on symptomatic individuals" (Menegale et al. 2023). Since breakthrough infections after vaccination have similar viral loads to those in non-vaccinated people, an effect of vaccination on SARS-CoV-2 transmission is likely extremely low, at best (Kissler et al. 2021; Acharya et al. 2022).

Second, it was asserted that vaccine mandates increased uptake of vaccine, and when implemented in colleges, saved many thousands of lives in the surrounding community (Murdoch and Caulfield 2023). In the study referenced, modeling for Canada suggested that vaccine mandates increased vaccine uptake by 0.9% (90% CI 0.7, 1.0), about 0.5 first doses per 100,000 people, or when using a time series method, by 2.9% (90% CI 1.3, 3.8) for first doses (Karaivanov et al. 2022). However, there was no effect on uptake of second doses of vaccine (Karaivanov et al. 2022). This is compatible with other studies that found vaccine mandates had little effect on absolute changes (generally <1%) in vaccine uptake in Canada and the United States (Anato et al. 2022; Howard-Williams et al. 2022). Of note, vaccine mandates for employment in elderly care homes in England was associated with an absolute reduction of 12% in the proportion of unvaccinated workers, but had no effect on resident COVID-19 mortality rates (Girma and Paton 2023). In the college study referenced, there was no significant effect of college vaccine mandates on cases in the surrounding community in models that adjusted for mask mandates, that dropped counties with staff vaccine mandates, or that adjusted for

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the effect of staggered college re-opening dates (Acton et al. 2022). That study also found that college mask mandates did not have an effect on surrounding community infection rates (Acton et al. 2022). Other limitations included that the study did not examine all-cause deaths, vaccine adverse events in students, nor the effect of curtailment of individual freedoms (Acton et al. 2022). This is particularly important because myocarditis/pericarditis is not that rare after vaccination in college aged people, and can be severe in approximately 20% of cases (including fulminant myocarditis in 7.5%, having extracorporeal membrane oxygenation in 4.4%, and death in 4.4%, of which 38% were sudden cardiac death proven at autopsy) (Cho et al. 2023). A systematic review found that, in studies that stratify by age and sex, the highest risk subgroup of vaccinees for myocarditis were young males within 7 days after dose 2 (Knudsen and Prasad 2023). For example, in the 5 studies that reported on males 12-29 years old after dose 2 of Pfizer vaccine, the rate ranged from 1/2562 to 1/9442 (Knudsen and Prasad 2023). A recent review estimated that 31207-42836 previously uninfected adults aged 18-29 years must be boosted with an mRNA vaccine to prevent one COVID-19 hospitalization, translating to, per Covid-19 hospitalization prevented, 18.5 serious adverse events (including 1.5-4.6 myocarditis cases in males), and 1430 to 4626 grade ≥3 reactogenicity cases (those that interfere with daily activities) (Bardosh et al. 2022). Some assert that the risk of myocarditis is higher after COVID-19, making vaccine overall beneficial even in young adults; however, this claim is not supported by good evidence. A large Nordic study found that, in 16–24-year-old males, the incidence of myocarditis was 1/72,993 after a case of SARS-CoV-2, far lower than after the second mRNA vaccine dose (Karlstad et al. 2022). A large study in England found that, in males under 40 years old after a second dose of Moderna vaccine, the myocarditis risk was far higher after vaccination than after a confirmed SARS-CoV-2 case (and far higher after a second dose of Pfizer vaccine that after a SARS-CoV-2 infection) (Patone et al. 2022).

Third, it was asserted that "it is clear, however, that high-quality masks can reduce pathogen spread and prevent infection" (Murdoch and Caulfield, 2023). This was based on a CDC study that had critical survey response bias, with initial response rates of 13.4% and 8.9%, and later attrition for "incomplete data" or "unable to report face mask use" of another 32% and 6.1% of participants (Andrejko et al. 2021). In addition, that study found no significant effect of wearing cloth masks, and an implausible adjusted odds ratio of 0.51 comparing "always" vs "never" wearing face masks in public (Andrejko et al. 2022). Two other supporting studies were referenced (Murdoch and Caulfield 2023). One was a study of NHS Trusts in the UK that found a 1.4% reduction in hospital acquired infections (defined as the percentage of total COVID-19 cases in the hospital, and not as the percentage of patients who acquired COVID-19 in hospital) during the Delta wave in Trusts that implemented FFP3 masks for staff (vs. Trusts using surgical masks), while not controlling for other interventions, ability to isolate patients, overcrowding, testing rates, or community rates of infections (Lawton et al. 2022). The other study found that ending school masking policies was associated with increased school cases (Cowger et al. 2022). There were several severe methodological weaknesses in this school masking study, discussed and reanalyzed (finding lack of efficacy) in more detail elsewhere (Hoeg 2023a). In particular, that study did not adjust for community case rates, and had critical detection bias because the US CDC recommended the testing only of unmasked close contacts in schools (not masked close contacts) through the spring of 2022 (Cowger et al. 2022; Hoeg 2023a). We believe that the effectiveness of masks, like all other medical interventions, should be judged based on the best and highest levels of evidence, when available. Community masking was known from meta-analyses of RCTs before the SARS-CoV-2 pandemic, and reaffirmed by RCTs during the pandemic, to not significantly affect community transmission of respiratory viruses, which now included SARS-CoV-2 (Jefferson et al. 2020, 2023; Xiao et al. 2020). The best evidence we know of found that school masking did not affect transmission of SARS-CoV-2 in schools (Coma et al. 2023; Juutinen et al. 2023; Chandra and Hoeg 2022). A regression discontinuity design study from Spain of masked 6-year-olds and unmasked 5-year-olds found no effect on transmission or case numbers (Coma et al. 2023). A comparison of two cities in Finland with different masking policies for 10–12-year-olds found no effect on transmission or case numbers (Juutinen et al. 2023). A study including 1832 counties in the US did not find a significant correlation between school mask mandates and

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COVID-19 cases in children (Chandra and Hoeg 2022). Mandated masking on children likely caused significant collateral damage. Masks are a constant reminder to be afraid of your friends as a vector of disease, contribute to learning loss (especially for those with hearing impairment or developmental delay) by affecting communication and understanding of instruction, and contribute to developmental delay by interrupting development of reading facial cues (necessary to understand emotions and intentions, and for facial recognition) and language acquisition in toddlers (Gori et al. 2021; Grundmann et al. 2021; Kastendieck et al. 2022; Kisielinski et al. 2023; Marini et al. 2021; Pazhoohi et al. 2021).

Fourth, it was asserted that "public health measures largely achieved the goals for which they were implemented" (Murdoch and Caulfield 2023). The references provided do not support that claim. The first reference, a systematic review from 2021, documented that among 35 included studies, the risk of bias was rated as low in only 3 studies, with major confounding in most studies and measurement bias in numerous studies, with different public health measures sometimes implemented simultaneously or soon after one another, and with often high heterogeneity (Talic et al. 2021). Importantly, the authors stated that "more stringent measures… need to be carefully assessed by weighing the potential negative effects of these measures on general populations… universal lockdowns are not, however, sustainable, and more tailored interventions need to be considered… ones that maintain social lives and keep economies functional while protecting high risk individuals…." (Talic et al. 2021). Negative effects mentioned included that interventions are "also disruptive to the psychosocial and mental health of children and adolescents, global economies, and societies" (Talic et al. 2021). The second reference analyzed potential reasons for different infection and mortality outcomes from COVID-19 in the United States (Bollyky et al. 2023). In analysis that controlled for comorbidity and statistically significant pre-COVID factors (first principal component analysis of poverty, inequality, education attainment, health access quality, lack of health insurance, and interpersonal trust), age-standardized COVID-19 mortality rates were not associated with a measure of state mandate propensity, bar closure, restaurant closure, gathering restriction, primary school closure, higher education closure, gym/pool closure, mask mandates, or stay-at-home order (Bollyky et al. 2023). They were however associated with vaccine mandates in schools and state employees, and vaccine coverage in the eligible population (Bollyky et al. 2023). This effect of vaccine mandates and vaccine coverage needs to be considered in the context of an inability to fully adjust for several collinear variables that were associated with vaccination, making "directionality challenging to assess" (Bollyky et al. 2023). For example, the main conclusion of the study was that cases clustered in states with adverse pre-pandemic conditions such that there occurred a syndemic, where "the combination of race and politics [e.g., higher percentage of Black people, and those who voted Republican] … [mutually reinforcing] pre-existing local health conditions and socioeconomic disparities [e.g., rates of poverty, access to high quality healthcare, interpersonal trust, income inequality, health insurance, healthy neighborhoods and behaviors, essential workers] drive the spread of disease and worsen adverse outcomes" (Bollyky et al. 2023). Trade-offs identified included that lower student reading test scores were associated with vaccine mandates for state employees and vaccine coverage, and lower student mathematics test scores additionally associated with mask use, mask mandates, vaccine mandates for school employees, and mandate propensity (Bollyky et al. 2023). Given these provided references, and the best evidence discussed above, we believe that the public health measures definitely had not "largely achieved the goals for which they were implemented" (Murdoch and Caulfield 2023).

Finally, the assertion that, while severe restrictions "clearly adversely affected some business sectors," an analysis of Sweden's "relaxed public health response… did not benefit its economy in the short term, compared with other Nordic countries" (Murdoch and Caulfield 2023). In addition, an analysis by the European Central Bank suggested that "swift action to reduce the spread of SARS-CoV-2 may have helped economies" (Murdoch and Caulfield 2023). Importantly, the effect of restrictions on the economy of any country was highly interdependent; when virtually all countries implement restrictions, that leaves little room for a country lacking similar restrictions, such as Sweden, to escape economic decline (Baldwin and di Mauro 2020). In Canada, according to the

referenced Statistics Canada study, in wave 1 the correlation between the percent change in severity of the restriction index and the percent change in retail sales, unemployment, and active firms was -0.78, -0.83, and -0.77 respectively, and during waves 2-3 the correlation was -0.31, -0.43, and -0.22 (perhaps lower because effects from the first wave had persisted over time) (Habli and Macdonald 2022). The effect was particularly marked once the restriction index reached a threshold of 41 (of a maximum score of 100), which occurred in most provinces during each wave (Habli and Macdonald 2022). The European Central Bank reported a SIR mathematical model to estimate the economic effects of restrictions if the probability of infection depended *only* on individual's endogenous choices (Jaccard 2022). Assumptions in their model included that agents *only* endogenously consider the effect on themselves of participation in the economy, and never the effect on others (in terms of contagion and proportion of population infected), that it is *fully* unobservable whether an agent is infected, and that the IFR of working age adults is 0.35% (which was reached only around age 60 years in other research), all of which are questionable (Jaccard 2022). In the end, Sweden avoided the massive new government debt that will affect countries like Canada for decades to come (Fuss and Hill 2023), and avoided other collateral damage such as having one of the lowest excess mortality rates from 2020-2023 of all OECD countries, and absent learning losses in their children (Eurostat 2023; Hallin et al. 2022; Redman 2023).

Implications

Confidence in public institutions

Murdoch and Caulfield (2023) went on to suggest what they call lockdown revisionism "contributes to real harm and has set a dangerous precedent… [because it] will further reduce confidence in public institutions, and will hamper acceptance of and compliance with measures needed to save lives in future pandemics. Inaccurate historical accounts of public health responses should not be normalized." Moreover, they suggested that "governments could consider strategies, including increased regulatory scrutiny, to address the risks of misinformation being amplified on social media," and "regulators of health professions should enforce evidence-based standards among their memberships" (Murdoch and Caulfield 2023). There is much to unpack here.

We agree with the statement that evidence-based standards should be used by health professionals and politicians. But we find chilling the call for "increased regulatory scrutiny" of social media and health professionals. A similar call was made by Sule et al. (2023) when concluding that "actions to regulate content or discipline physicians who participate in misinformation propagation related to COVID-19… A coordinated response by federal and state governments and the profession" is needed. During the pandemic this type of censorship led to the illusion of false consensus among so-called experts (Arora and Bhattacharya 2023; Shir-Raz et al. 2022; Simandan et al. 2023; Bardosh 2023; Saltelli et al. 2023; Sandman 2021). The ensuing groupthink, and what has been called mass formation, led to more censorship and false consensus, and to the self-appointed guardians of misinformation and disinformation exemplified by Murdoch and Caulfield (Joffe 2021; Desmet 2022; Schippers et al. 2022). Science works by considering evidence-based controversies and working to study and resolve those controversies over time. We believe that this was disallowed during the pandemic.

We agree with the statement that "inaccurate historical accounts of public health responses should not be normalized" (Murdoch and Caulfield 2023). Given the evidence we have considered above, we believe that Murdoch and Caulfield (2023) perpetuate such inaccurate accounts. We believe that reduced confidence and trust in public institutions (e.g., public health, health authorities, and medical committees and experts) is the result of the lack of evidence-based policies and many inaccurate claims/statements made. For example, the Center for Disease Control and Prevention in the U.S. was documented to have reported 25 important statistical or numerical errors (i.e., misinformation), of which only 11 were later corrected after being notified of the error (Krohnert et al. 2023). In addition, the CDC decided to mask children as young as 2 years old, extended into 2023, which "calls into question the agency's ability to make appropriate, evidence-based guidance" (Hoeg

et al. 2023b). An analysis of 77 studies pertaining to masks during the pandemic and published in the journal MMWR (overseen by the CDC) found that "publications drew positive conclusions about mask effectiveness over 75% of the time despite only 30% testing masks and <15% having statistically significant results" (Hoeg et al. 2023c). Given this, we believe that Sule et al (2023) also perpetuated inaccurate accounts, because they defined misinformation on vaccine safety/efficacy, and mask effectiveness and negative consequences "as assertions unsupported by or contradicting US CDC guidance." A modelling study by the Public Health Agency of Canada exaggerated the value of NPIs - analysis suggested the study was "superficial, deeply flawed and provides a disservice to the evaluation of these important issues" (Grant et al. 2022). Many other false presumptions made during COVID policy decisions have also been discussed (Bhattacharya and Kulldorff 2023). Trust, once lost, is difficult to replace and must be re-earned. We believe that the implementation of "measures [purported to be] needed to save lives" was done without adequate consideration of best evidence and cost-benefit, and acceptance and compliance with such measures in the future is not warranted. Measures such as increasing stringency of lockdown, mask mandates, school masking, and school closures, were not recommended in pre-COVID pandemic plans for a virus of the severity of SARS-CoV-2, and, as discussed above, have been re-confirmed to be not only ineffective, but to have severe cost-benefit imbalance (WHO 2019). It will take work to earn back trust, and this can start with a transparent discussion of what went wrong, and apology for mistakes made.

What went wrong?

We believe the fundamental error during the SARS-CoV-2 pandemic was not using the emergency management (EM) process (Joffe and Redman 2021c; Schippers et al. 2022; Redman 2021a, 2021b). Leaders seemed to attempt to re-invent pandemic response, ignoring previous pandemic plans, contrary suggestions, thorough cost-benefit analyses, and accountability. Some reviews of pandemic response seem to be re-discovering the EM process that should be used in managing a pandemic response (Simandan et al. 2023; Bardosh 2023; Schippers and Rus 2021; Rajan et al. 2020; Rangel et al. 2022; Buck et al. 2020; Brown 2020; Paul et al. 2021, 2022; Baral et al. 2020). To earn back trust, this error must be corrected.

Emergency Management (EM) is the prevention and mitigation of, preparedness for, response to, and recovery from emergencies, regardless of the risk/hazard (Redman 2021a). An EM Agency (EMA) coordinates requests from the Subject Matter Agency (the agency dealing with the direct effects of the hazard, here, public health), while also dealing with the indirect effects of the hazard (here, pandemic and response) (Redman 2021a). The EMA coordinates the four simultaneous EM critical functions of preparation, mitigation, response, and recovery (Redman 2021a). The EM process steps are the same for any public emergency, including a pandemic (Joffe and Redman 2021c; Schippers et al. 2022; Redman 2021b). The EM process, how it ideally could have occurred during the SARS-CoV-2 pandemic, and errors at each step (other than step 1) that occurred during this pandemic are shown in Table 2 (Joffe and Redman 2021c; Redman 2021b).

By not following the correct EM process, the wrong aim and lack of thorough cost-benefit analyses led to massive collateral damage (Bardosh 2023; Joffe 2021). This collateral damage included deterioration in mental health, learning loss, unemployment, missed healthcare screening and care, and increased inequality in society (Bardosh 2023; Joffe 2021; Schippers et al. 2022). Each of these is a strong determinant of population lifespan and early mortality, promising to cause far more loss of wellbeing years in the future than COVID-19 could (Foster and Frijters 2022; Joffe 2021). This is particularly true given that the most adversely affected group may be children, especially from disadvantaged homes (Foster and Frijters 2022; MacPherson and Green 2023). Globally the collateral damage is even worse, with marked increases in poverty and food insecurity, undetected and untreated Tuberculosis and HIV, missed childhood vaccinations, increased gender violence and inequality, and learning loss (Bardosh 2023; Joffe 2021; Schipper et al 2022). In a systematic review, Bardosh (2023) summarized the immense collateral damage due to the pandemic response (Table 1). Even simply considering the large association of social isolation or loneliness with all-cause mortality should have been cause for concern (Wang et al. 2023). Taking into account the many flaws and

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uncertainties in global excess death calculations, a recent review concluded that "globally deaths from SARS-CoV-2 may be the minority of calculated excess deaths", with this from causes that may include disruption of healthcare services, acute cardiovascular disease, chronic disease such as cancer, reversal in progress for infectious diseases, hunger, mental health deterioration, drug overdose, and "diverse worsening circumstances" (Ioannidis et al. 2023). Even if lockdowns did work (they did not), these costs to population wellbeing were calculated, very early in the pandemic, to far exceed any possible benefit (Foster and Frijters 2022; reviewed in Joffe 2021). The collateral damage promises to cause more loss of wellbeing than COVID-19 could cause.

Table 1. Quotations from others that support our conclusion that reasonable scrutiny of evidence is required to learn lessons from the SARS-CoV-2 pandemic.

Source	Quotation
Bardosh (2023)	The promotion of lengthy social distancing restrictions by governments and scientific experts during the Covid crisis had severe consequences for hundreds of millions of people… a rise in non-Covid excess mortality, mental health deterioration, child abuse and domestic violence, widening global inequality, large increases in debt, food insecurity, lost educational opportunities, unhealthy lifestyle behaviors, increased loneliness and social polarization, democratic backsliding and human rights violations… [Some] will shape individual and collective lives and livelihoods for many years ahead… adverse changes in life opportunities, especially in younger ages, shape future health outcomes and socio-economic well-being during an individual's lifespan… and can create downward spirals of lost opportunity… The pandemic response leaves behind a legacy of poverty, mental health illness, learning loss, debt, food insecurity, social polarization, erosion of respect for human rights and elevated excess mortality for non-Covid health conditions.
Simandan et al. (2023)	…proportionality is one of the entrenched principles of public health ethics and stipulates that the benefits of a public health intervention should outweigh its harms and burdens… implementing the principle would have required the joint assessment of three areas of study: (a) the actual morbidity and mortality of the virus, (b) effectiveness of non-pharmaceutical interventions, and (c) unintended harms and burdens of non-pharmaceutical interventions… many critical scholars have taken them [media and government narratives] at face value… [what should have been done] is work deconstructing both the 'terrible virus' narrative and the narratives concomitantly inflating the actual effectiveness of non-pharmaceutical interventions against viral transmission and minimizing their harms and burdens… the crux of the problem is the failure by critical scholars to exercise their analytical skills and reveal the mismatch between the media and governmental narratives on the one hand, and the developing scientific literature on COVID-19 on the other hand.

Table 2. The Emergency Management Process, and failures in this process during the SARS-CoV-2 pandemic.

EM Step	Ideal during the SARS-CoV-2 pandemic	Failed realization during the SARS-CoV-2 pandemic
Step 1: Identification of the hazard.	The Hazard: SARS-CoV-2	The Hazard: COVID-19. This led to focus on case fatality rate (instead of infection fatality rate), and case counts (instead of infection and case rates stratified by age and underlying conditions), contributing to excessive fear.
Step 2: Selection and maintenance of the aim.	Aim: to minimize the impact of the hazard and response on the society of the jurisdiction.	Aim: varied from "flatten the curve" to "eradicate SARS-CoV-2" to "protect the healthcare system" (each of which may have been an objective to consider in the mission analysis Step 5). This led to exclusive focus on COVID-19 cases while ignoring all other predictable impacts on society.
Step 3: Establish a Governance Task Force - to	Governance Task Force: requires involvement of many diverse stakeholders, led by the most senior government official.	Governance Task Force: gave undue influence to public health and medical 'experts'.

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provide leadership for all policy, programs, and actions taken.		This led to groupthink, and, at best, a non-transparent and unclear task force (Bardosh 2023; Rajan et al. 2020; Rangel et al. 2022).
Step 4: Risk/Hazard assessment.	Risk/Hazard assessment: the extreme age-dependent risk, and the predictable impacts on critical infrastructure (including healthcare).	Risk/Hazard assessment: consisted of misleading slogans such as "we're all in this together", "no one is safe unless everyone is safe", and "the virus does not discriminate." This led to blanket one-size-fits-all responses, and focus on healthcare solely for COVID-19.
Step 5: Mission Analysis – define objectives of *what* needs to be done.	Mission Analysis: include maintaining confidence in government by reducing fear; protecting seniors in long-term care homes and in the community with multiple comorbidities (i.e., focused protection); protecting critical infrastructure and essential services (i.e., ensure continuity of healthcare, education (an essential service), businesses, and economy). A tenet of mitigation is to protect those most at risk by separating them from the threat.	Mission Analysis: objectives seemed to be to induce fear (to ensure compliance with mandates), and to prevent COVID-19 cases to the exclusion of all else (by ending social interactions) (Simandan et al. 2023; Brown 2020; Paul et al. 2021). This led to inadequate consideration of objectives compatible with the ideal aim (Step 2), and predictable collateral damage.
Step 6: Defining courses open/options – to determine *how* mission analysis objectives can be met.	Defining courses open/options: determine courses open for each grouping of tasks, by using previous pandemic plans and evidence, and assigning teams to each task (with appropriate diverse expertise to prevent groupthink); cost-benefit analysis of each course open (to justify choices between options); and planning for and preventing predictable collateral damage as much as possible. This might have included creating plans for: long-term care homes and for seniors in the community with multiple comorbidities; creating new surge capacity in hospitals (without sacrificing healthcare for non-COVID conditions); public communication (e.g., presenting risk in context (Olabi et al. 2021)), presenting hospitalization and death rates stratified by age (giving denominators, not raw case counts), and explaining difficult trade-offs); and to maintain societal function as much as possible (e.g., without closing schools, businesses, and economy).	Defining courses open/options: considered only those options instituted by neighboring countries (Sebhatu et al. 2020), including lockdowns, mask mandates, and school closures to prevent social interactions, and de-emphasized expected severe collateral damage (by inducing fear, silencing opposition, slogans (e.g., "lives vs the economy"), and conveying consensus and certainty) (Simandan et al. 2023; Bardosh 2023; Rajan et al. 2020; Brown 2020; Paul et al. 2021). This led to attempts to end social interactions that were ineffective, failed to focus protection on the most vulnerable, and lacked cost-benefit weighting (that led to predictable collateral damage). Healthcare surge capacity was not created, and existing resources were simply re-allocated by shutting down healthcare for conditions other than COVID-19.
Step 7: Public issuing of a written evidence-based response plan.	Public Plan: to show transparent demonstrably justified due diligence.	Public Plan: this was ignored altogether (Rajan et al. 2020). This led to confusion, loss of trust, and lack of accountability.

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Step 8: Repeat this ongoing process.	Repeat: include considering new information as it accrues and seeking and considering public feedback.	Repeat: seemed to reject information contrary to chosen courses open by labelling it 'misinformation' (Murdoch and Caulfield 2023; Simandan et al. 2023; Bardosh 2023; Buck et al. 2020; Himelfarb et al. 2023). This led to continued attempts to end social interactions, mandate non-pharmaceutical interventions, and mandate vaccination that failed to consider accruing information on relative lack of efficacy and collateral harms.

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"We didn't know"

Although not stated by Murdoch and Caulfield, this potential defense is inadequate. First, we believe that the job of those leaders implementing potentially harmful interventions for pandemic management entailed knowing as much as possible, including weighing predictable harms and benefits. Much literature before the COVID-19 pandemic indicated that, as discussed above, lockdowns, school closures, and community mask mandates were not recommended due to unfavorable cost-benefit (Bhattacharya et al. 2023; Jefferson et al. 2020, 2023; Xiao et al. 2020; WHO 2019). At the very least, previous pandemic plans, and the EM process should have been known (Redman 2021b). Second, this does not excuse denigrating those with some expertise who voiced concerns with the implemented measures due to their unfavorable cost-benefit balance (Arora and Bhattacharya 2023; Shir-Raz et al. 2022; Simandan et al. 2023; Bardosh 2023; Foster and Frijters 2022). This included the Caulfield et al. (2021) response to an early newspaper editorial by Joffe and Redman (2021a) who proposed an Emergency Management response to the pandemic with 3 priorities (protect concentrations of high-risk seniors; enact surge capacity in hospitals; and replace fear with confidence). The response misrepresented arguments (creating easy Straw Man arguments to defeat, without engaging with the evidence), and contained factual inaccuracies that exaggerated the threat from COVID-19 and minimized the harms from lockdowns (Joffe and Redman 2021b). Third, over the course of the pandemic knowledge accrued that seemed to be ignored and was not adopted into timely adjustment of policies (Paul et al. 2022). Examples included evolving literature on the efficacy of natural immunity, the inability of vaccines to stop viral transmission, the inefficacy of community masking, and the inefficacy and harms of school closure, as discussed above.

To earn back trust, we believe (along with many others) that public health, medical and governmental leaders owe the public an explanation and apology for their handling of the pandemic, taking accountability for how decisions were made and implemented (Venkat et al. 2022; Kay 2022; Thakur 2022; Prasad 2022).

Conclusion

Simandan et al. (2023) summarized much of our main thesis (Table 1). If lockdown "revisionism" can be defined as "the spread of misinformation on lockdowns and other public health measures" (Murdoch and Caulfield 2023), then Murdoch and Caulfield might be considered dangerously close to being revisionists themselves. To ensure lessons are learned for the future, we must be willing to engage in rigorous and open debate – calling reasonable critical scrutiny of evidence 'misinformation', 'disinformation', or 'revisionism' is not supportive of this goal. The lesson from the COVID-19 pandemic we believe is not to have increased focus on so-called 'misinformation' and 'revisionism', but rather to re-discover the EM process in making decisions that ensure wide multidisciplinary representation, transparency, cost-benefit analyses using the best evidence available (and repeated as new evidence becomes available), and that protects against censorship and groupthink. A start to earning back trust would be an apology rather than doubling down about so-called 'misinformation'.

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