JOURNAL OF CONTROVERSIAL IDEAS

Article

Alarm about Childhood Vaccinations: A Persistent Panic?

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Submitted: 7 May 2021, accepted: 8 March 2022, published: 29 April 2022

Abstract: Some threats to the social order, such as crime, drugs and terrorism, give rise to ongoing alarms. To understand both the alarms and their persistence, it is useful to draw on two bodies of theory. Moral panic theory addresses alarms about groups or activities that transgress social norms, proposing several characteristic features, but does not explain why a moral panic would persist. Several concepts from studies of scientific controversies, including the lack of impact of new evidence, help to explain how a moral panic might continue indefinitely. To illustrate the combined use of moral panic and controversy theory, the case study of the alarm over unvaccinated children and criticisms of childhood vaccines is used. Persistent panics potentially have several negative consequences, especially for groups targeted as causing a danger.

Keywords: moral panics; scientific controversies; vaccination

How to cite: Martin, B. Alarm about Childhood Vaccinations: A Persistent Panic? *Journal of Controversial Ideas* **2022**, *2*(1), 6; doi:10.35995/jci02010006.

Introduction

A moral panic is an alarm in society about a group or activity that is seen as transgressing social boundaries, posing a threat to the moral order. Sociologist Stanley Cohen conceptualised moral panics, using the examples of the Mods and the Rockers in Britain in the 1960s.[1] These groups, through their dress and behaviour, challenged conventional moral expectations. Cohen called them "folk devils".

Since Cohen's formulation, many social scientists have studied moral panics, in the process proposing modifications or extensions of the original idea.[2] Among the host of

1 Stanley Cohen, *Folk Devils and Moral Panics: The Creation of the Mods and Rockers,* 3rd ed. (London: Routledge, 2002).

2 For an overview of moral panic analyses, see Sarah Wright Monod, *Making Sense of Moral Panics: A Framework for Research* (Cham: Palgrave Macmillan, 2017).

examples of moral panics that have been named or examined are youth, girl gangs, AIDS, social media and sex on the screen.

In some cases, moral panics may seem relatively harmless, being in retrospect little more than a manifestation of current moral strictures. However, many panics have significant consequences for the stigmatised group, namely the folk devils, and can lead to laws, policies and practices with far-reaching effects.

Of special interest are panics that involve major social mobilisations over a lengthy period, with ongoing impacts. Examples are the war on drugs, the war on crime and the war on terror. In each case the "war" has continued for decades and has had drastic consequences for individuals, groups and entire countries caught up in campaigns of attempted eradication.

In each of these examples, the so-called war has served to define and unify an in-group by vilifying an out-group. The out-groups are variously users of illegal drugs, criminals and terrorists. By stigmatising these groups, the rest of society is sanctified: the danger to the in-group is expelled symbolically, and sometimes sent to prison or death.

Underlying the concept of moral panic is the assumption that a society's response to folk devils is unreasonable or disproportionate to any danger.[3] After all, if the Mods and Rockers in Cohen's day had posed a significant physical danger to members of society, then it would have been sensible to raise alarms about them. Crime and terrorism undoubtedly pose a danger to society, so to call the war on crime or the war on terror a moral panic is based on the assumption that these "wars" constitute a reaction disproportionate to the danger, or perhaps a reaction that perpetuates and aggravates the danger. (The issue of proportionality is addressed later.)

Moral panic theory has most commonly been applied to relatively transient issues, ones that in retrospect seem misguided or even amusing, as revealing more about society than about the folk devil in question. Sustained alarm-based mobilisations, such as the wars on crime, drugs and terrorism, have attracted extensive popular and scholarly attention, but more commonly from the framework of social problems than moral panics.[4] This raises the question of whether using a moral panic analysis provides useful insights into persistent panics.

Cohen's original formulation of moral panics has been modified and extended in various ways. For example, it has been linked to processes of moral regulation,[5] and has been applied to climate change in contrasting ways, with folk devils in the issue being seen to be climate sceptics[6] or climate scientists.[7] Moral panics have been contrasted

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[3] In the preface to the third edition of his book, Cohen notes the importance of disproportionality to assessing a phenomenon as a moral panic.

[4] Representative publications include Nils Christie, *Crime Control as Industry: Towards Gulags, Western Style* (London: Routledge, 1994); Johann Hari, *Chasing the Scream: The First and Last Days of the War on Drugs* (London: Bloomsbury, 2015); Lisa Stampnitzky, *Disciplining Terror: How Experts Invented "Terrorism"* (Cambridge: Cambridge University Press, 2013). For an application of moral panic analysis to terrorism, see Gershon Shafir and Cynthia E. Schairer, "The war on terror as political moral panic," in *Lessons and Legacies of the War on Terror: From Moral Panics to Permanent War,* eds. Gershon Shafir, Everard Meade and William J. Aceves (London: Taylor and Francis, 2013) 9–46.

[5] Sean P. Hier, Dan Lett, Kevin Walby and André Smith, "Beyond folk devil resistance: Linking moral panic and moral regulation," *Criminology & Criminal Justice* 11 (2011): 259–76.

[6] Avi Brisman and Nigel South, "New 'folk devils,' denials and climate change: Applying the work of Stanley Cohen to green criminology and environmental harm," *Critical Criminology* 23 (2015): 449–60.

[7] Amanda Rohloff, *Climate Change, Moral Panics, and Civilization* (New York: Routledge, 2019).

with "moral breaches" in which folk devils have been treated as victims rather than threats to the moral order.[8]

The approach here is to analyse a particular long-standing social issue using a moral panic framework to see what insights it can provide. For this purpose, the starting point is close to the original formulation of moral panic theory by Cohen and his interpreters. The issue addressed is vaccination, a highly contentious topic. In the next section, the usual moral panic stages and features are presented and mapped onto the vaccination controversy. After this, the issue of whether alarm about vaccine hesitancy and vaccine critics is proportionate to the danger they pose is addressed. At this point in the analysis, concepts from the study of scientific controversies are introduced and applied to the vaccination debate, helping explain the persistence of the vaccination controversy. In the conclusion, the relevance of this analysis to other issues is outlined.

The focus here will be on childhood vaccines, in particular the ones recommended by governments for all children for the past few decades and that have been the focus of public discussion about vaccination during this time.[9] The advent of Covid[10] and the development of vaccines to prevent or ameliorate the disease have generated a huge new set of vaccine debates, for example over adverse reactions, mandatory vaccination and vaccine passports. Given the intense publicity and contention over Covid vaccines, it can be difficult to reflect back on the concerns raised about childhood vaccines. The primary reason for excluding Covid vaccines from this analysis is that concerns about them are too new for any associated panic to be considered persistent. Perhaps by the year 2030 it will be possible to judge whether alarms about critics of Covid vaccines have been "persistent". Nevertheless, some of the arguments presented here may also apply to Covid vaccines.

Vaccination Matters

Vaccination involves exposing a person to a small dose of an agent, called a vaccine, with the aim of stimulating the immune system so that the person is resistant to exposure to a virus or a bacterium causing a disease. For example, the polio vaccine contains small amounts of modified versions of polio viruses designed to stimulate the immune system but not cause polio.

Vaccines have been developed for a large number of infectious diseases, and many more are in development. Governments recommend that children receive specified vaccines at particular ages, for example, in Australia, hepatitis B vaccine at birth and

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[8] Jennifer Carlson, "Moral panic, moral breach: Bernhard Goetz, George Zimmerman, and racialized news reporting in contested cases of self-defense," *Social Problems* 63 (2016): 1–20. Carlson describes a "moral breach" in this way: "(1) it is characterized by competing, rather than complementary, narratives; (2) it reframes folk devils as victims and disrupts clear-cut allocations of blame; (3) it emphasizes harm to communities rather than harm to social order; and (4) it elicits calls for dialogue and acknowledgement rather than collective punishment and shaming" (p. 2).

[9] To refer to childhood vaccines is a convenient shorthand given that some vaccines are recommended for adults as well as children, notably the flu vaccine. The focus is on vaccines recommended for all or nearly all people, thus excluding ones, such as anthrax or yellow fever vaccines, usually reserved only for those who might be exposed to specific infectious agents.Young children are not in a position to make informed decisions about vaccination; decisions about childhood vaccines are most commonly made by their parents. This raises important ethical issues, but these are not central to the analysis here drawing on moral panic theory and controversy studies.

[10] Covid is used here as shorthand for COVID-19, which in turn is shorthand for coronavirus disease of 2019, the disease caused by the virus labelled SARS-CoV-2.

the combined vaccine for measles, mumps and rubella (MMR) at 12 and 18 months, as well as many other vaccines.[11]

Vaccines are supposed to provide protection against full-blown disease, but sometimes immunity is not sufficiently stimulated, or wears off over time. Furthermore, some people receive little or no benefit from certain vaccines, for instance very young children and people whose immune systems are compromised, for example due to drugs to treat cancer.

An important concept is herd immunity. For infectious agents that spread from person to person, if very few people are susceptible to the agent, then it has difficulty spreading—local outbreaks are more likely to contract over time than to expand—thus providing protection to the community, known as the herd, hence the term *herd immunity*.[12] The level of immunity needed for herd immunity depends on the disease; for a highly infectious disease like measles, authorities may seek vaccination rates of 95% or more.

Vaccination is routinely lauded as one of the greatest contributions to public health. It is backed by nearly all governments and health authorities, as well as by nearly all researchers in the area.[13] Nevertheless, there has been opposition to vaccination from its earliest days.

Critics of vaccination raise a number of concerns.[14] Most important are adverse reactions to vaccination, which affect a small percentage of people and can sometimes lead to disability or death. Some critics question the value of vaccination, arguing that its benefits are not as large as claimed. Critics usually argue that parents should be able to choose whether or not their children are vaccinated.

The vaccination issue is commonly posed as a conflict between supporters and opponents, between pro-vaxxers and anti-vaxxers. This misrepresents the diversity of views in the area. Many parents want their children to receive most but not all vaccines, or to receive them all spaced out in a schedule different from the recommended one. Some proponents consider all such parents to be anti-vaxxers, so classifying anyone who does not adhere to the recommended vaccination schedule. Also muddying the picture are parents who support vaccination but whose children are not fully vaccinated due to obstacles, for example difficulties in accessing a doctor; such parents outnumber those conscientiously opposed to vaccination. The misleading dichotomisation into pro-vax and

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[11] Australian Government, Department of Health. *National Immunisation Program Schedule.* https://www.health.gov.au/health-topics/immunisation/immunisation-throughout-life/national-immunisation-program-schedule.

[12] Scientists continue to analyse matters concerning herd immunity; there are many complications. For an introduction, see Ben Ashby and Alex Best, "Herd immunity," *Current Biology* 31 (2021): R174–R7.

[13] The case for vaccination is presented, for example, in F. E. Andre, R. Booy, H. L. Bock, J. Clemens, S. K. Datta, T. J. John, B. W. Lee, S. Lolekha, H. Peltola, T. A. Ruff, et al., "Vaccination greatly reduces disease, disability, death and inequity worldwide," *Journal of the World Health Organization* 86 (2008): 140–6; Paul A. Offit and Louis M. Bell, *Vaccines: What You Should Know,* 3rd ed. (Hoboken, NJ: John Wiley, 2003); Stanley A. Plotkin, Walter A. Orenstein and Paul A. Offit, *Vaccines,* 6th ed. (Amsterdam: Elsevier, 2013).

[14] See for example Mateja Cernic, *Ideological Constructs of Vaccination* (Newcastle Upon Tyne: Vega Press, 2018); Louise Kuo Habakus and Mary Holland (eds.), *Vaccine Epidemic: How Corporate Greed, Biased Science, and Coercive Government Threaten Our Human Rights, Our Health, and Our Children* (New York: Skyhorse, 2011); Richard Halvorsen, *The Truth about Vaccines: How We Are Used as Guinea Pigs without Knowing It* (London: Gibson Square, 2007).

anti-vax treats vaccination as a unity, to be supported or opposed in full, and lays the basis for stigmatising critics.[15]

In the past two decades, alarm about reluctance to vaccinate and criticism of vaccination has become a frequent theme in countries such as Australia and the US. In 2019, the World Health Organization declared vaccine hesitancy—"the reluctance or refusal to vaccinate despite the availability of vaccines"—to be one of the top ten threats to public health worldwide.[16] Here, I initially examine this continuing concern using moral panic theory.

Kenneth Thompson in his book *Moral Panics* lists five elements or stages in a moral panic.[17] These can readily be related to the vaccination issue, at least in Australia, the US and some other countries.

First, a group or activity is defined as a threat to the community. Children who are not fully vaccinated are seen as a threat to other children. In the US, this threat is used to justify barring unvaccinated children from school. Parents who do not ensure that their children are vaccinated are often seen as responsible for disease outbreaks.[18] In some circles, such parents are shunned. In Australia, they are penalised by receiving a reduced level of government welfare payments. People who openly question vaccination are seen as the greatest threat. One particular critic, gastroenterologist Andrew Wakefield, has been widely condemned for undermining trust in vaccination. He is the most prominent folk devil in the panic about vaccination criticism.[19]

Second, in Thompson's model, there is a suitable media portrayal of the threat. In Australia and the US, cases of measles are newsworthy, with media reports commonly quoting authorities who comment about the danger and blame "anti-vaxxers" for the danger.[20]

Third, public concern builds rapidly. Vaccination does not fit this feature of moral panics particularly well. Alarm about infectious diseases has been around for decades. There are some periods when concern grew about particular diseases, but concern about vaccine scepticism and hesitancy seems to have developed gradually.

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15 On the shortcomings of the concepts of "anti-vaxxer" and "antivaccine movement", see Gabriela Capurro, Josh Greenberg, Eve Dubé and Michelle Driedger, "Measles, moral regulation and the social construction of risk: Media narratives of 'anti-vaxxers' and the 2015 Disneyland outbreak," *Canadian Journal of Sociology* 43 (2018): 25–47; Jeremy K. Ward, "Rethinking the antivaccine movement concept: A case study of public criticism of the swine flu vaccine's safety in France," *Social Science & Medicine* 159 (2016): 48–57.

16 World Health Organization, "Ten threats to global health in 2019," 2019, https://www.who.int/emergencies/ten-threats-to-global-health-in-2019.

17 Kenneth Thompson, *Moral Panics* (London: Routledge, 1998).

18 For example, Steven Reinberg, "Low vaccination rates and Disney measles outbreak," *WebMD,* 16 March 2015, quoting prominent vaccination promoter Paul Offit as saying, "I have never seen so much anger towards parents who are choosing not to vaccinate."

19 For example, Jeremy Laurance, "Andrew Wakefield's MMR vaccine theory has been discredited for years, but he just won't go away," *Independent,* 5 May 2018. This is just one of thousands of stories. The UK General Medical Council withdrew Wakefield's licence to practise medicine, but this did not mean he was no longer a gastroenterologist, which is a medical research appellation. Wakefield's treatment has been the subject of a large body of commentary, pro and con. For a treatment by an historian of science, see Mark A. Largent, *Vaccine: The Debate in Modern America* (Baltimore, MD: Johns Hopkins University Press, 2012), 94–137.

20 For example, Autumn Johnson, "Anti-vaxxers to blame for Disneyland measles outbreak, report concludes," *Patch,* 18 March 2018.

Fourth, opinion leaders and authorities respond. This is certainly the case for vaccination. Opinion leaders, including politicians and health authorities, have raised the alarm about vaccine-preventable diseases. As noted above, governments have taken measures to promote vaccination. The most extreme measures are in some US states, such as California, where religious and conscientious objections to vaccination have been disallowed for the purposes of children attending school.

Fifth, in Thompson's model, eventually the panic fades away, with or without social changes. In the case of vaccination, the panic is in full swing. Some major changes have been made, and more can be anticipated.

In summary, the moral panic framework applies reasonably well to vaccination, except that concerns about vaccine critics have developed more gradually and been more persistent than the typical panics studied. Vaccination might be classified as a slow-motion panic, or a sustained panic, in contrast to relatively short-lived or localised concerns about Mods, Rockers, satanic rituals, school violence or teenage pregnancy.

Erich Goode and Nachman Ben-Yuhuda provide a somewhat different set of indicators for moral panics: heightened concern over the behaviour of a group; hostility towards the group; general consensus that the threat from the group is real and serious; alarm about the group's activities being disproportionate to its threat; alarm rising suddenly and then fading away suddenly.[21] The first three of these—concern, hostility and consensus—apply to vaccination, and the question of disproportionality will be addressed in the next section. The final indicator, volatility, does not apply: concern about vaccination is persistent rather than transient.

Since the original formulation of moral panic theory, there have been several new developments: the mass media are no longer so dominant; the concept of moral panic has gained currency outside the academy; folk devils can fight back, including by using social media; and entrepreneurs can try to manufacture moral panics for commercial reasons.[22] However, these factors seem not to have much effect on persistent panics, which continue much the same as before.

Proportionality

In applying the moral panic framework to vaccination, there is an important issue to address: proportionality. Supporters of vaccination can and do argue that unvaccinated children and vaccine critics are actually a serious danger to public health and that strong measures to ensure high levels of vaccination are warranted. In other words, if there is a panic, it is a reasonable response proportionate to the risk.

Addressing the issue of proportionality is challenging because it goes to the heart of vaccination as a scientific controversy, a topic introduced in the next section. On many points there are claims and counterclaims seemingly without end, so reaching a definitive endpoint can seem impossible. Rather than trying to make a conclusive statement about proportionality, all that will be attempted here is to show that a plausible case can be made that a generalised alarm about unvaccinated children and vaccine critics is disproportionate to the danger they pose, and hence that strong measures to ensure high levels of childhood vaccination for all vaccine-preventable illnesses are excessive

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[21] Erich Goode and Nachman Ben-Yuhuda, *Moral Panics: The Social Construction of Deviance* (Oxford: Blackwell, 1994), 33–41.

[22] Angela McRobbie and Sarah L. Thornton, "Rethinking 'moral panic' for multi-mediated social worlds," *British Journal of Sociology* 46 (1995): 559–74.

in relation to the danger they are intended to counter, recognising that any conclusion in this area is bound to be disputed. What constitutes a "strong measure" is a matter of judgement, and can be debated. Barring unvaccinated children from attending school is treated here as a strong measure.[23]

It is important to acknowledge that not being vaccinated for a particular disease can permit harm to a person's health and, should they contract the disease, they may possibly infect others. In addition, someone who questions vaccination and discourages this person from being vaccinated can be contributing to harm to the person's health. The question is not whether non-vaccination and vaccine criticism are potentially harmful but rather whether the alarm about them is proportionate to the danger they pose. That is a complex issue for a number of reasons, so it is worthwhile unpacking some of the assumptions often made in discussions about vaccination.

In talking about a panic about vaccination, it is useful to distinguish between two related alarms. The first is alarm, or simply concern, about children who have not been vaccinated. The second is alarm about people who raise concerns about vaccination—vaccine critics—and about people who have concerns, even if not expressed, something called vaccine hesitancy. These two alarms are related in various ways, the most important of which is that vaccine critics may cause others to develop reservations about vaccination.

For the purposes of assessing whether alarms associated with vaccination are unnecessarily great, it is useful to refer to two claims, each corresponding to one of the two related alarms. The first claim is that the panic about children who have not been vaccinated is disproportionate to the danger they pose. The second claim is that the panic about vaccine critics is disproportionate to the danger they pose.

To look at the issue of proportionality, there is yet another complication. Vaccination, as a practice, is not a unitary entity but consists of different vaccines for different diseases. Much of the alarm about unvaccinated children and vaccine critics is undifferentiated: all vaccines are packaged together so far as public discourse is concerned. But when looking at risk and proportionality, it is important to note that the contents of the package are not uniform.

The dynamics of different vaccine-preventable diseases differ considerably. Some are highly contagious, most notably measles, whereas others are less so: tetanus is not contagious at all. Therefore, the collective benefits from widespread vaccination vary considerably from one vaccine to another. Similarly, the individual benefits vary enormously. Without vaccines, some diseases previously infected nearly every child, for example mumps and chickenpox; vaccines prevent most of these illnesses, but with variable personal benefits, since only a few who contract mumps or chickenpox suffer long-lasting harm. On the other hand, without vaccines, some diseases, for example rotavirus and pneumococcal disease, affect only a small proportion of the population. More generally, the harms caused by different diseases vary dramatically from person

[23] A number of philosophers have argued the case for compulsory vaccination: Jessica Flanigan, "A defense of compulsory vaccination," *HEC Forum* 26, no. 1 (2014): 5–25; Alberto Giubilini, "An argument for compulsory vaccination: The taxation analogy," *Journal of Applied Philosophy* 37, no. 3 (2020): 446–66; Alberto Giubilini and Julian Savulescu, "Vaccination, risks, and freedom: The seat belt analogy," *Public Health Ethics* 12, no. 3 (2019): 237–49; Roland Pierik, "Mandatory vaccination: an unqualified defence," *Journal of Applied Philosophy* 35, no. 2 (2018): 381–98. (I thank a reviewer for these citations.) It is quite possible to accept the arguments for compulsory vaccination and yet to consider the alarm about unvaccinated children and vaccine critics as disproportionate to the danger they pose.

to person. For example, many people have HPV (human papillomavirus) in their system, but only in a small proportion does this lead to cervical cancer. Then there are the risks from vaccines, which can vary from one to another. Some vaccines lead to vanishingly small numbers of reports of adverse events, whereas many more adverse events are reported for others, such as the HPV vaccine.[24]

Because the patterns of vaccine-preventable diseases vary so considerably, as do the benefits and risks of vaccines for different diseases, it can be argued that there should be separate policies for different vaccines, or at least groups of vaccines that have similar impacts, rather than a single category of "vaccination". Various analogies can be drawn, for example to transport or sport. The danger from riding a motorbike is, per kilometre, far greater than the danger from travelling by passenger jet, so it makes sense to raise concerns about specific modes of travel rather than transport in general. Similarly, the danger to health from boxing is far greater than the danger from swimming, so it makes sense to raise concerns about specific sports rather than sport in general.

Here, I will distinguish between claim 1-vax, that the alarm about children who are not fully vaccinated is disproportionate to the danger they pose, and claim 1-measles, the alarm that children who are not vaccinated against measles is disproportionate to the danger they pose, and other analogous claims such as 1-polio and 1-rotavirus. Similarly, I will distinguish between claims 2-vax, 2-measles, et al., that the alarm about people who raise concerns about vaccination in general, or about specific vaccines, is disproportionate to the danger they pose.

The argument here is that there is strong evidence for more than one of the specific claims in the 1 category and, ipso facto, for the corresponding claims in the 2 category. There is also evidence for the more general claim 1-vax, but it is not as strong as for some of the specific claims in category 1. Note again that these are claims about disproportionality, not about the benefits of vaccines. It is quite possible for a vaccine to have nett benefits (for individuals and the population) yet for the alarm about unvaccinated children and about vaccine criticism to be excessive compared to the danger they pose.

First consider 1-polio: the claim that alarm about children not being vaccinated against polio is disproportionate to the danger they pose. Not being vaccinated against polio is sufficient for a child to be considered unvaccinated and hence, in the US, unable to attend school without an exemption, and some states allow exemptions only for medical reasons. Also, not being vaccinated against polio is enough for the parents of such a child to be given the label "anti-vax" and otherwise stigmatised. In short, not being vaccinated against polio is enough, in the US at least, for invocation of the full set of measures and attitudes associated with vaccine refusers.

What is the danger? In the US, there have been no cases of polio for two decades. The level of vaccination needed to achieve herd immunity is probably less than 90%.[25] Hence there should be no worry about a resurgence of polio due to 10% of children not being vaccinated. Most parents ensure that their children have polio vaccinations. The alarm about children who are not vaccinated against polio, because it is wrapped up with

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[24] See figures reported in Lucija Tomljenovic and Christopher A. Shaw, "Human papillomavirus (HPV) vaccine policy and evidence-based medicine: Are they at odds?" *Annals of Medicine* 45 (2013): 182–93, for example Figure 2 on p. 185. Note that Tomljenovic and Shaw's research has been fiercely criticised by defenders of HPV vaccination programmes.

[25] Paul E. M. Fine, "Herd immunity: History, theory, practice," *Epidemiologic Reviews* 15, no. 2 (1993): 265–302.

alarm about children who are not vaccinated against other diseases, or not vaccinated at all, is thus excessive compared to the danger.

Second consider 1-tetanus. Not being vaccinated against tetanus is sufficient for a US child to be considered unvaccinated. Herd immunity is irrelevant because tetanus is not contagious. Hence the alarm about children who are not vaccinated against tetanus is excessive compared to the danger—certainly the danger to others.[26]

Third consider 1-mumps. Prior to the availability of a vaccine, mumps was "a nuisance widely considered so harmless it was a frequent butt of jokes."[27] There was no alarm about dangers from mumps, but with the availability of a vaccine came a campaign to make people fear the disease by emphasising the most concerning effects, however rare or unproven. This set a pattern for other vaccine-preventable diseases: their dangers were highlighted and all the diseases were lumped together in a single category, regardless of their danger.[28]

So, next consider 1-vax, the claim that the alarm about unvaccinated children is disproportionate to the danger they pose. This claim can be considered an amalgam of the claims for each vaccine in the schedule. A child who has received only three of the four doses of the inactivated polio vaccine recommended in the US, while receiving all other vaccines, is considered unvaccinated. Alarm about the danger posed by this child is, if 1-polio is accepted, disproportionate. To rebut 1-vax, it is necessary to show that some unvaccinated children pose such a danger that public alarm is warranted. To consider this issue, it is useful to look at four risk comparisons: deaths, collective benefits, economic costs and resurgence. Of various possible comparators, here alcohol is used most commonly because reducing alcohol consumption has both individual and collective benefits.[29]

The first risk comparison concerns deaths. The number of deaths from vaccine-preventable childhood diseases is extremely low compared to those from many other causes. For example, the number of deaths per year of US children from measles is close to zero, and there are very few childhood deaths from other infectious diseases.[30]

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[26] There is a complication: tetanus vaccination is normally part of the DTP (diphtheria, tetanus and pertussis) triple vaccine, so in practice it is unlikely that a child would receive vaccines for diphtheria and pertussis but not tetanus. Parents who want to pick and choose vaccines for their children may have limited options. However, this does not change the logic of the 1-tetanus claim.

[27] Elena Conis, *Vaccine Nation: America's Changing Relationship with Immunization* (Chicago: University of Chicago Press, 2015), 64.

[28] Ibid., 81: " . . . as the seventies progressed, *all* of the vaccine-preventable diseases were increasingly portrayed as a monolithic category whose members were uniformly threatening to the health of American families. . . . campaign materials issued by local health departments and the flurry of accompanying media reports all contained the same message: *any* disease that could be prevented with a vaccine was dangerous, if not deadly, to children. In such accounts, any difference in risk or severity among infections was depicted as negligible." [emphasis in the original].

[29] It is possible to argue that the danger from unvaccinated children and vaccine critics warrants alarm, and that the problem is that there is not sufficient alarm about other dangers, such as those from alcohol. Economists deal with comparative risks by, for example, calculating the cost of preventing one death through various measures, for example installing handrails or mandating airbags in cars. Setting aside the value judgements involved in such calculations, this does not solve the problem of determining whether alarm about a risk should be considered warranted, exaggerated or insufficient: perhaps greater or lesser alarms would be appropriate for a whole suite of risks. Few moral panic analyses address this general issue, seemingly setting the criteria for disproportionality by observing discrepancies from attitudes and policies concerning commonly accepted risks. That is the path taken here.

[30] Some assessments of mortality take into account the number of years of life forgone, so that the death of a child involves the loss of more years of potential life than the death of an adult, especially the death

This can be compared to the number of excess deaths due to drinking alcohol, which is far greater.[31] Even though vaccination rates in Australia are high and stable,[32] the government withdrew financial benefits to push rates even higher.[33] Yet there is no great alarm about people who drink alcohol or those who foster drinking, such as companies that sell and advertise alcoholic drinks.[34]

The second risk comparison concerns collective benefits. Proponents of vaccination continually highlight the importance of herd immunity, by which high levels of individual immunity to a disease protect those who cannot be immunised. However, the same sort of collective benefit would result from lower levels of drinking: as well as benefits to drinkers themselves, there would be benefits to others in the form of less domestic violence and fewer traffic accidents. A community of teetotallers would provide collective health benefits. Governments have introduced some measures to reduce the dangers, for example random breath testing. However, the level of alarm about alcohol is far less than that about vaccine-preventable disease. There are news stories about a few cases of measles[35] but it is rare to see a news story about a few people who became drunk.

The third risk comparison concerns economic costs. Illnesses often result in loss of income or interruption to schooling. It can reasonably be argued that high levels of vaccination for a particular disease, even if the disease caused no deaths or disability, could result in considerable cost savings, thus benefiting the community through lowered expenditures. However, do cost savings provide a suitable rationale for a continual alarm about unvaccinated children and vaccine critics? There would be cost savings from a

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of an elderly person. This would mean that the deaths of children from infectious diseases would weigh more heavily than the deaths of adults from, say, cirrhosis of the liver. Another complication is that some children die from domestic violence, much of it perpetrated by alcoholic parents. In addition, children of alcoholics are more likely to become alcoholics themselves and to suffer foetal alcohol syndrome, which can greatly reduce life expectancy. Given these complexities, no attempt is made here to make comparisons that take into account years of life forgone. It is useful to reiterate that the argument here is about alarms, not deaths or years of life.

31 Goodarz Danaei, Eric L. Ding, Dariush Mozaffarian, Ben Taylor, Jürgen Rehm, Christopher J. L. Murray and Majid Ezzati, "The preventable causes of death in the United States: Comparative risk assessment of dietary, lifestyle, and metabolic risk factors," *PLoS Medicine* 6, no. 4 (2009): e1000058, gives a figure of 64,000 annual excess deaths in the US from alcohol. To make this comparison more rigorous, it would be necessary to compare, for example, all preventable deaths from vaccine-preventable diseases with all preventable deaths from drinking alcohol. The figures cited here are indicative of the wide difference likely to be found in such a comparison. The comparison here is intended to suggest differences at the level of orders of magnitude rather than offer a detailed enumeration of all deaths from vaccine-preventable illnesses and from other causes.

32 Frank H. Beard, Brynley P. Hull, Julie Leask, Aditi Dey and Peter B. McIntyre, "Trends and patterns in vaccination objection, Australia, 2002–2013," *Medical Journal of Australia* 204, no. 7 (18 April 2016): 275.e1–e6.

33 Stephen S Holden, "Who speaks for 'we' speaks not for 'me'—the vaccination debate," *Griffith Journal of Law & Human Dignity* 4, no. 1 (2016): 1–23; Julia LeMonde, "An Australian newspaper campaign and government vaccination policy," *Prometheus: Critical Studies in Innovation* 37, no. 2 (2021): 137–54.

34 Advertisements for alcoholic drinks are not permitted in some media and venues, and sales to children are restricted. Taxes on alcoholic drinks are an important economic disincentive. These and other measures intended to reduce alcohol consumption are important. There are alarms about particular behaviours by drinkers, notably driving and domestic violence, but the stigma attached to these behaviours seldom carries over to "social drinkers". In comparison, the stigma attached to being less than fully vaccinated and criticising vaccines applies to all, not just those with problematic behaviours such as meeting with others while knowingly being infected.

35 Morgan Krakow, "A tourist infected with measles visited Disneyland and other Southern California hot spots in mid-August," *Washington Post*, 25 August 2019.

reduction in alcohol consumption, soft drink consumption, and various other changes in diet and behaviour, but failure to make such changes, while increasing costs to the community, seldom lead to alarms. Another possible comparison is with exercise: lack of exercise contributes to ill health, yet there is little in the way of a continual alarm about individuals who do not exercise and the costs they impose on the community through their greater levels of ill health.

The fourth risk comparison concerns resurgence of disease. It is important to address the argument that rates of vaccination-preventable diseases are low today precisely because vaccines are successful. If this is the case, then alarm about possible declines in vaccination rates, and about the influence of vaccine critics, might be warranted, namely proportionate to the danger. This is analogous to arguing that alarm about declining investment in fire prevention, such as fire engines and fire drills, is warranted even though the damage due to fires is fairly small, because the damage might increase.

How can this argument be addressed? One possibility is to compare rates of disease and death due to vaccination-preventable diseases in countries with and without high levels of vaccination. The challenge is finding comparator countries that are otherwise similar, and this is likely only for diseases where governments in some countries recommend vaccination whereas those in other countries do not. Furthermore, to the extent that recommendations vary according to the circumstances, as they should, including varying assessments of risks, benefits, costs and priorities, this sort of comparison will not be very informative. Another possibility is to examine rates of disease and death in the same country before and after introduction of mass vaccination for specific diseases. If the rates of disease before mass vaccination were large and seen as unacceptable, then it can reasonably be argued that concern about declining rates of vaccination today, and about vaccine critics, is warranted.

There is yet another complication. In before-and-after-mass-vaccination comparisons, should the measure be the number of cases of disease, the economic cost of disease or the number of cases of disability and death? If someone has the flu or mumps or chickenpox and recovers, is this of sufficient import to raise an alarm?

Vaccination proponents regularly cite the massive death toll from influenza in the aftermath of World War I, the high levels of deaths from measles and diphtheria a century ago, and the human cost of polio before vaccinations. However, a possible resurgence of infectious diseases does not provide a rationale for present vaccination policies. For highly infectious diseases such as measles and pertussis, the death rate prior to mass vaccination in countries such as Australia and the US was not all that great compared to today's major causes of death.[36] Furthermore, if death rates for such diseases started to escalate due to lower levels of immunity, it would be straightforward to protect the population by increased or improved vaccination.

The scare about mass death from infectious diseases sometimes is about a new virus, such as swine flu or bird flu. But current vaccines (pre-Covid) are unlikely to provide protection against a new virus[37]—that is precisely why new diseases warrant concern. It

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[36] In the US in the 1950s, about 450 measles deaths were reported annually: Walter A. Orenstein et al., "Measles elimination in the United States," *Journal of Infectious Diseases* 189 (Supplement 1) (2004): S1–S3. This can be compared to the figure, cited earlier, of 64,000 for deaths from alcohol, which is vastly larger even taking into account population increase.

[37] To the extent that flu aggravates the effects of Covid, and to the extent that flu vaccines protect against the flu, it might make sense to promote flu vaccination to reduce the burden of Covid. The same could be said of anything that improves health, including exercise, good diet and avoidance of toxins.

makes little sense to justify high levels of community immunity to polio or hepatitis as protection against a deadly new coronavirus.[38]

This examination of the rationales shows that there is a lack of strong evidence warranting alarms about unvaccinated children and vaccine critics. This is especially true when children are considered unvaccinated because, although receiving some or most vaccines, they have not received all of them, or not within the recommended time frame. In other words, they are partially vaccinated or have had their vaccines spaced out, but are categorised as unvaccinated and considered a cause for alarm, as evidenced by policies banning them from attending school. The possibility of a resurgence of an infectious disease does not offer a sensible rationale for creating alarm about the relatively small number of children who have not received some or all recommended vaccines.

It is reasonable to have a concern about infectious disease and to take measures to prevent illness and death. Furthermore, it is plausible that the nett benefits of widespread vaccination, in terms of health and cost, are significant. The point here is that the alarm about unvaccinated children and criticism of vaccines is disproportionate to the danger when comparisons are made with other causes of preventable death and disease.

In summary, there is strong evidence for claims 1-polio, 1-tetanus and 1-mumps, namely that alarms about children unvaccinated against these diseases are disproportionate to the dangers they pose; there is similar evidence for many other claims in the 1 category. This evidence is also strong for claims 2-polio et al., namely that alarms about critics of vaccines for these particular diseases are disproportionate to the dangers they, the critics, pose. As for claims 1-vax and 2-vax, there is also more general evidence, via risk comparisons, regarding deaths, collective benefits, economic costs and resurgence, though this evidence is not as strong as for many of the specific claims such as 1-polio and 2-polio. In addition, claims 1-vax and 2-vax can be thought of as an amalgamation of various specific claims, such as 1-polio and 2-polio, for which there is strong evidence, indicating that the alarm about anyone who is not fully vaccinated or who criticises any vaccine is far too sweeping, incorporating as it does a disparate collection of partially unvaccinated individuals. Although by the assessment here, the evidence is strong, it is neither definitive nor uncontested. It is to be expected that vaccination proponents will argue that concerns about less-than-fully-vaccinated children and vaccine critics are fully justified. Note again that the argument here is about a public alarm, not about the benefits of vaccination. It is quite possible to conclude that measures to promote vaccination are beneficial to individuals and society, while at the same time the alarm about unvaccinated children and vaccine critics is disproportionate to the danger they pose.

Pulling together these strands, persistent moral panics are likely to have these features:

- A group or set of ideas defined as a threat to the community
- Widespread condemnation of the group or ideas
- Attacks on the group or ideas by some politicians and media

[38] It is possible that criticism of childhood vaccines can lead to greater vaccine hesitancy so that when a new agent arrives on the scene—as in the case of the new coronavirus—there is greater vaccine hesitancy concerning vaccines for the new disease. On the other hand, if members of the public become sceptical about some childhood vaccines because they seem unnecessary or pose an undue risk of adverse reactions, they may carry this scepticism over to new vaccines for a much more deadly disease. In other words, those who believe the alarm about childhood vaccines is excessive may not respond with alacrity to more urgent alarm bells. How to assess the role of these factors is not obvious.

- Alarm disproportionate to the danger.

Dynamics of Scientific Controversies

However, there is more to the vaccination issue than these features. To get a handle on other features, it is useful to turn to studies of scientific controversies.[39] Some such controversies proceed primarily inside the scientific community, for example the dispute over gravitational waves.[40] The vaccination debate is an example of a *public* scientific controversy: there is debate and disagreement both within professional circles and in the wider public sphere.[41] Examples include debates over climate change, nuclear power, pesticides, fluoridation, genetic modification and microwaves—and vaccination.[42] Among the common features of such controversies are polarisation, the role of interests, the limited impact of new evidence and the sidelining of alternatives.

Polarisation refers to the coalescence of partisan positions into two opposing camps. This is most obvious in the language used: pro-vax and anti-vax. In polarised controversies, partisans deploy standard sets of evidence and argument, and make no concessions to opponents. Public scientific controversies typically involve disagreements about risks, benefits, ethics and decision-making. On all four of these areas, partisans always line up together. Proponents of vaccination say the benefits are large, the risks are minuscule, seeking high levels of community protection through herd immunity is the ethical option, and decisions should be made by health authorities informed by experts. Critics of vaccination say the benefits are overrated, the risks are greater than normally acknowledged, that informed and uncoerced choice is the ethical option, and decisions

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[39] H. Tristram Engelhardt, Jr. and Arthur L. Caplan, eds., *Scientific Controversies: Case Studies in the Resolution and Closure of Disputes in Science and Technology* (Cambridge: University Press, 1987); Daniel L. Kleinman, Karen A. Cloud-Hansen, Christina Matta and Jo Handelsman, eds., *Controversies in Science and technology: From Climate to Chromosomes* (New Rochelle, NY: Mary Ann Liebert, 2008); Daniel Kleinman, Jason A. Delborne, Karen A. Cloud-Hansen and Jo Handelsman, eds., *Controversies in Science and Technology: From Evolution to Energy* (New Rochelle, NY: Mary Ann Liebert, 2010); Daniel L. Kleinman, Abby J. Kinchy and Jo Handelsman, eds., *Controversies in Science and Technology: From Maize to Menopause* (Madison, WI: University of Wisconsin Press, 2005); Dorothy Nelkin, ed., *Controversy: Politics of Technical Decision* (Beverly Hills, CA: Sage, 1979).

[40] Harry M. Collins, *Gravity's Kiss: The Detection of Gravitational Waves* (Cambridge, MA: MIT Press, 2017).

[41] Despite the name, these "scientific controversies" are not just about science, but typically involve differences in views about ethics, economics, dissent and decision-making. These seemingly "non-scientific" aspects of the controversy interact with knowledge claims so that, for example, judgements about scientific findings are influenced by ethical factors and research agendas are influenced by governments and corporations with a stake in the controversy, which means that "the science" can be less than comprehensive and objective. On scientific research agendas being shaped, see, for example, David J. Hess, *Undone Science: Social Movements, Mobilized Publics, and Industrial Transitions* (Cambridge, MA: MIT Press, 2016). The idea that scientific knowledge is influenced by, or intertwined with, social factors is standard in the field of the sociology of scientific knowledge. See, for example, Barry Barnes, *Scientific Knowledge and Sociological Theory* (London: Routledge & Kegan Paul, 1974); David Bloor, *Knowledge and Social Imagery* (London: Routledge & Kegan Paul, 1976); Michael Mulkay, *Science and the Sociology of Knowledge* (London: Allen and Unwin, 1979).

[42] From a sociological perspective, to call a dispute a scientific controversy does not entail a judgement about the validity of the arguments. A controversy can exist even when the overwhelming weight of expert scientific opinion lies on one side; indeed, this is a common configuration. Accordingly, to refer to vaccination as being controversial does not imply that the sides are equally balanced in credibility, influence or anything else.

should be made by individuals and parents. Proponents and critics often talk past each other, not addressing issues and arguments presented by their opponents.[43]

The significance of this sort of polarisation is that intermediate positions are marginalised. No one prominent in the vaccination debate says the benefits are large and the risks small, yet there should be no encouragement to vaccinate. Nor does anyone say the benefits are overrated and the risks understated, yet the nett benefit warrants strong pressures for vaccination. Anyone of stature who adopts such an intermediate position will have aspects of their stands trumpeted by opponents and be shunned by their erstwhile allies: there are enormous pressures to join one side or the other, or to drop out of the debate. An example is Robert Sears ("Dr Bob"), a US doctor who has recommended modification of vaccination schedules.[44] Although he supports vaccination, he has been condemned by advocates.[45] Because support for vaccination is the dominant position, anyone who deviates from the standard line is likely to be categorised as anti-vax.

In many public scientific controversies, there are groups with an interest—a stake—in supporting a position. They do not need to be lead players, but their presence provides a continuing controversy driver. In the case of vaccination, pharmaceutical companies that manufacture and sell vaccines have the most obvious vested interest. The companies have not played a strong overt role in the vaccination debate but, at least according to critics, their influence on research and testing of vaccines can be influential.

The medical profession also has a stake in vaccination, because for decades it has lauded vaccination as one of the greatest ever contributions to public health. It would be embarrassing to admit that some vaccines are unnecessary, that the vaccination schedule is too full, or that the adverse effects of some vaccines outweigh their benefits.[46]

Sociologists use the term "moral entrepreneurs" to refer to groups that promote concern, or panic, about a social issue.[47] In the case of vaccination, the groups most active in this process are pro-vaccination campaigners, sections of the medical profession, some politicians and sections of the media. Many members of the public join in the process. The controversy persists because the promoters face resistance, from vaccine-critical groups and from parents who question vaccination, sometimes seeking exemptions or modification of schedules. Some authors have argued that vaccine hesitancy derives from personal experience—in particular, parents' experiences of adverse effects from vaccinations—and that vaccine-critical groups are the result of such parents seeking support more than the cause of their concern.[48] In any case, the

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[43] Floriana Gargiulo, Florian Cafiero, Paul Guille-Escuret, Valérie Seror and Jeremy Ward, "Asymmetric participation of defenders and critics of vaccines to debates on French-speaking Twitter," *Scientific Reports* 10 (2020): 6599.

[44] Robert W. Sears, *The Vaccine Book: Making the Right Decision for Your Child,* rev. ed. (Boston: Little, Brown, 2011).

[45] Paul A. Offit and Charlotte A. Moser, "The problem with Dr Bob's alternative vaccine schedule," *Pediatrics* 123, no. 1 (2009): e164–e169.

[46] For example, Peter Aaby has done research showing that DTP (diphtheria, tetanus and pertussis triple vaccine) increases the mortality rate in poor countries, but this has not affected vaccination recommendations. See Peter C. Gøtzsche, *Vaccines: Truth, Lies and Controversy* (Copenhagen: People's Press, 2020). Gøtzsche is one of the few scientists with an intermediate position on vaccination issues, strongly supporting some vaccines while criticising others.

[47] See for example Howard S. Becker, "Moral entrepreneurs: The creation and enforcement of deviant categories," in *Deviance: A Symbolic Interactionist Approach,* ed. Nancy J. Herman (Lanham, MD: Rowman & Littlefield, 1995), 169–78.

[48] Stuart Blume, *Immunization: How Vaccines Became Controversial* (London: Reaktion Books, 2017).

existence of resistance to vaccine government recommendations enables campaigners to continue to stoke the panic.

One of the striking features of long-lasting scientific controversies is that new evidence seems to have little impact.[49] Typically, partisans trumpet new findings favourable to their position while ignoring, dismissing or attacking unfavourable findings.[50] Vaccine critics rarely give any attention to the large volume of research supporting vaccination published in journals such as *Vaccine.* Similarly, vaccine promoters seldom mention studies arguing that widespread childhood vaccination for chickenpox may be leading to an increase in shingles in adults.[51]

Another feature of many public scientific controversies is the sidelining of alternatives. In many cases, there are different ways to achieve the goals of campaigners, but these are subordinated to winning against opponents.

The goal of both supporters and critics of vaccination is to protect and improve health, especially children's health. This is often forgotten in the heated condemnations of the other side. The focus of the confrontation is vaccination, but there are other ways to promote health, including ways to improve immunity to disease. Research has shown the value of good diet, exercise, mindfulness and sleep in improving immunity.[52] Some

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[49] That a controversy lasts for decades despite ongoing research can be taken as indicating that new evidence has little effect, at least on the persistence of the controversy. It is extremely rare for a partisan in such a controversy to significantly change their viewpoint, again suggesting that evidence is not sufficient to bring the controversy to a close. One of the few partisans to change sides after reviewing evidence is John Colquhoun, "New evidence on fluoridation," *Social Science and Medicine* 19, no. 11 (1984): 1239–46.

[50] In the fluoridation controversy, proponents trumpet studies showing large reductions in tooth decay but rarely mention critiques of the benefits of fluoridation (e.g., Mark Diesendorf, "The mystery of declining tooth decay," *Nature* 322 (1986): 125–9). In the nuclear power controversy, critics came under attack (e.g., Leslie J. Freeman, *Nuclear Witnesses: Insiders Speak Out* (New York: Norton, 1981)). In the controversy over depression and antidepressants, a study showing the benefits of exercise (James A. Blumenthal et al., "Effects of exercise training on older patients with major depression," *Archives of Internal Medicine* 159 (1999): 2349–56) did little to alter the views of proponents of antidepressants. Melvin Reuber's research on links between pesticides and cancer led to attacks on his credibility and career (Keith Schneider, "Hard times: Government scientists fall victim to the administration's policy to silence debate," *Amicus Journal* (Fall 1982): 22–31). Ignacio Chapela's research on transgenic DNA and Mexican maize triggered attacks on his findings (Jason A. Delborne, "Transgenes and transgressions: Scientific dissent as heterogeneous practice," *Social Studies of Science* 38, no. 4 (2008) 509–41). Re the vaccination controversy, there are studies showing that having certain childhood diseases can lower the risk of heart disease and cancer in later life (e.g., Yasuhiko Kubota, Hiroyasu Iso, Akiko Tamakoshi and the JACC Study Group, "Association of measles and mumps with cardiovascular disease: The Japan Collaborative Cohort (JACC) study," *Atherosclerosis* 241, no. 2 (18 June 2015): 682–6; Daniel W. Cramer, Allison F. Vitonis, Simone P. Pinheiro, John R. McKolanis, Raina N. Fichorova, Kevin E. Brown, Todd F. Hatchette and Olivera J. Finn, "Mumps and ovarian cancer: Modern interpretation of an historic association," *Cancer Causes and Control* 21, no. 8 (2010): 1193–201). The existence of such studies is never mentioned by vaccination proponents.

[51] G. S. Goldman and P. G. King, "Review of the United States universal varicella vaccination program: Herpes zoster incidence rates, cost-effectiveness, and vaccine efficacy based primarily on the Antelope Valley Varicella Active Surveillance Project data," *Vaccine* 31 (2013): 1680–94. The relationship between chickenpox vaccination and shingles incidence has been debated in scientific journals; it is controversial. The point here is that this issue almost never surfaces in commentary about vaccination that reaches the general public.

[52] Richard J. Davidson et al., "Alterations in brain and immune function produced by mindfulness meditation," *Psychosomatic Medicine* 65 (2003): 564–70; Charlene E. Gamaldo, Annum K. Shaikh and Justin C. McArthur, "The sleep-immunity relationship," *Neurologic Clinics* 30, no. 4 (2012): 1313–43; Peter Katona and Judit Katona-Apte, "The interaction between nutrition and infection," *Clinical Infectious Diseases* 46, no. 10 (2008): 1582–8; Neil P. Walsh et al., "Position statement. Part one: Immune function and exercise,"

parents who have concerns about vaccines seek other ways to ensure their children's wellbeing, and pay attention to some of these areas,[53] but proponents of vaccination seldom mention other routes to immunity and health.[54]

From this perspective, vaccine critics are convenient scapegoats, justifying an alarm about vaccine hesitancy and diverting attention from other paths for improving health. This brings controversy analysis in touch with moral panic analysis: the scapegoats are the folk devils.

Studies of scientific controversies thus suggest four additional features of persistent panics. The full set of features thus becomes:

- A group or set of ideas defined as a threat to the community
- Widespread condemnation of the group or ideas
- Attacks or criticisms of the group or ideas by some politicians and media
- Alarm disproportionate to the danger
- Polarisation of partisan positions into two opposing camps
- Groups with a stake in subduing opposition
- Failure of new evidence to affect partisan positions
- Marginalisation of alternatives.

Negative Consequences

In a persistent panic in which the alarm is disproportionate to the danger, there is an opportunity cost involved: excessive attention is given to a smaller danger, while larger dangers are relatively neglected. There is unfairness for groups targeted as sources of or responsibility for the danger. They, as the folk devils, are condemned and may be subject to harassment and discrimination.

In the usual formulation of moral panics, social changes result, and this includes new laws or selective enforcement of previously neglected laws. The new or newly enforced laws may represent institutionalised unfairness. They are also a key part of what makes a

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Exercise Immunology Review 17 (2011): 6–63. Diet, exercise, mindfulness and sleep can improve general immune function but do not give specific immunity to diseases such as measles. Mindfulness, for example, is unlikely on its own to provide adequate immunity to exposure to a high level of measles virus. Nevertheless, it is well accepted that only some people exposed to an infectious agent succumb to full-blown disease, so it is reasonable to assume that improvements in general immune functions can make a difference, at the margins, to susceptibility to specific diseases. In other words, for a given exposure, improving immune function is likely to enable some individuals to avoid illness. In this context, it is worth noting that vaccination is not a guarantee against contracting a disease: it does not necessarily lead to immunity and hence is not the same as immunisation, though "vaccination" and "immunisation" are often used synonymously. There are examples of measles outbreaks in fully vaccinated populations (Tracy L. Gustafson, Alan W. Lievens, Philip A. Brunell, Ronald G. Moellenberg, Christopher M. G. Buttery and Lynne M. Sehulster, "Measles outbreak in a fully immunized secondary-school population," *New England Journal of Medicine* 316 (1987): 771–74). Vaccination can improve specific immunity, sometimes dramatically, but improvements to immune function can still make a difference in susceptibility to specific diseases. In other words, immunity to any specific disease is not purely a yes or no matter, but one of degree, and the degree of immunity can potentially be improved in a number of ways with varying impact.

[53] Jennifer A. Reich, *Calling the Shots: Why Parents Reject Vaccines* (New York: New York University Press, 2016); Paul R. Ward, Katie Attwell, Samantha B. Meyer, Philippa Rokkas and Julie Leask, "Understanding the perceived logic of care by vaccine-hesitant and vaccine-refusing parents: A qualitative study in Australia," *PLoS ONE* 12 (2017): e0185955. (12 October 2017).

[54] There are important public health campaigns promoting exercise, good diet and sleep. The point here is that these areas are seldom mentioned in public commentary by vaccination proponents.

panic persistent: a return to the status quo ante requires changes to laws or enforcement practices.

These facets can be seen in the panic in the vaccination arena. As already noted, the alarm over vaccine criticism and hesitancy leads to relative neglect of other options for boosting immunity and for dealing with preventable causes of ill health. There have been extensive attacks on vaccine critics. In Australia, this has included abusive online commentary, complaints to government agencies, censorship of talks,[55] and sending of pornography. The polarisation of the controversy has meant marginalisation of more respectful ways of dealing with vaccine hesitancy, based on non-judgemental conversations with parents, as advocated by some researchers.

There is an injustice involved in measures that are more punitive than necessary to address the likely harm averted. In Australia, parents whose children are not fully vaccinated are denied a portion of welfare benefits they would ordinarily receive. Most parents subject to these penalties are not opposed to vaccination, but have failed to have their children fully vaccinated for practical reasons, for example distance from doctors.[56] Many of these parents are on low income, so government payments are crucial to their children's welfare. The policy thus has a harmful effect on some children's welfare.[57]

Conclusions

There have been many studies of crime, drug problems, terrorism and other issues in which there is a long-lasting alarm about dangers to society. To better understand the

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[55] It is possible to justify censorship, depending on the circumstances. Neil Levy, "No-platforming and higher-order evidence, or anti-anti-no-platforming," *Journal of the American Philosophical Association* 5, no. 4 (2019): 487–502, argues that there are good reasons to no-platform some speakers because appearing on a platform, at least one with some level of credibility, adds to the credibility of the speaker. Ruth Palmer, *Becoming the News: How Ordinary People Respond to the Media Spotlight* (New York: Columbia University Press, 2018) makes this same point in several places. However, there are complications in applying Levy's ideas to the vaccination issue, in which no single person is an expert on all facets of the issue. Levy gives the example of an epidemiologist having opinions about vaccination. However, an epidemiologist is not, solely by virtue of epidemiological expertise, an expert on vaccination policy or on individual vaccination choice. Expertise in relation to such issues is better understood as a collective accomplishment. It may be just as problematical to allow an epidemiologist to comment on vaccination policy as for an economist, psychologist or ethicist.Another consideration is that some speakers seek to be no-platformed (i.e., to provoke attempts to block their speeches) so they can be seen as victims and attract greater interest and support for their ideas. This has been called censorship backfire.Levy writes "But audiences seem warranted in assuming that reputable media organisations and other institutions filter out unrepresentative individuals unless they are genuinely exceptional in their expertise" (496). There are too many counterexamples to make this assumption across the board. Edward S. Herman, *The Real Terror Network: Terrorism in Fact and Propaganda* (Boston: South End Press, 1982) showed that US media favoured terrorism experts who lacked deep expertise and for whom conflicts of interest were treated as giving them greater credibility. In the lead-up to the 2003 invasion of Iraq, a totally unrepresentative intelligence source (later discredited) was given great credibility in the *New York Times.* More generally, access to the mass media—an important platform—is powerfully shaped by a variety of vested interests, so it is hard to argue that no-platforming in this context is a reliable way of excluding bad views. See for example W. Lance Bennett, *News: The Politics of Illusion* (Chicago, IL: University of Chicago Press, 2016).

[56] Frank H. Beard, Brynley P. Hull, Julie Leask, Aditi Dey and Peter B. McIntyre, "Trends and patterns in vaccination objection, Australia, 2002–2013," *Medical Journal of Australia* 204, no. 7, (2016), 275.e1–5.e6.

[57] Julie Leask and Kerrie Wiley, Submission 327 to the Senate Community Affairs Legislation Committee regarding the Social Services Legislation Amendment (No Jab, No Pay) Bill 2015. http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Community_Affairs/No_Jab_No_Pay/Submissions.

processes involved in such "persistent panics," two bodies of theory are drawn upon, using the issue of the alarm over vaccination hesitancy and vaccine critics as an illustration.

Moral panic theory provides a useful framework for understanding how a group or practice can be identified as a threat to the moral order, stigmatised and targeted with adverse actions. The alleged threat serves to unify the community in opposition, drawing on us–them dynamics. However, most moral panic analyses have been of alarms that subside in a matter of months or a few years. This leaves unexplained the phenomenon of persistent panics, ones that continue for decades.

The study of scientific controversies offers several concepts that help explain persistence: polarisation, the role of groups with vested interests, the failure of new evidence to affect partisan positions, and the marginalisation of alternatives. These help to explain why some public scientific controversies, such as those over pesticides and fluoridation, continue largely unchanged over many decades. On the other hand, controversy researchers have less often addressed the phenomenon of alarm over challenges to dominant scientific views, something better addressed by moral panic theory.[58]

To illustrate the value of combining moral panic theory with controversy studies, the case study of vaccination is useful. The dominant view is that vaccination is beneficial and should be encouraged. But this isn't all: in some countries for at least the past two decades, parents whose children are not fully vaccinated have become stigmatised, and public criticism of vaccination has been seen as a cause for alarm.

The response to vaccine critics and vaccination hesitancy shows several features of a moral panic, including identification of folk devils (the source of danger to the moral order), media amplification of the threat, responses by authorities, and alarm disproportionate to the danger.

The vaccination issue is also a scientific controversy, suggesting the value of drawing on insights from controversy studies. Like many other public scientific controversies, in the public debate over vaccination the two main sides are highly polarised: there is little space or encouragement for intermediate positions. There are groups involved with vested interests in vaccination, enabling a continuation of the debate irrespective of any new evidence. Finally, the prominence of the debate overshadows other options for improving children's immunity and health.

The framework of moral panics can also be applied to the approach used by vaccine critics, which can involve trying to create an alarm about vaccine injuries and stigmatising of public health officials and other vaccination proponents. Vaccine critics have far fewer resources—money, jobs, authoritative endorsements, policies, infrastructure—than proponents, which can help to explain why the critics' efforts have not created a panic except within restricted circles. If we imagine a different world in which alarm about vaccines is and remains greater than alarm about vaccine-preventable diseases, it is plausible that the same features of persistent panics would apply except with a different set of folk devils.

The combination of moral panic theory and controversy studies offers a way to understand persistent panics of various sorts, including panics over crime, drugs and terrorism. In each of these issues, there are stigmatised groups typical of the folk devils in moral panic theory: criminals, drug dealers and terrorists. These issues also show

[58] There are many studies seeking to explain questioning of the consensus scientific view about climate change, but few studies probing into why this is such a preoccupation.

characteristics of public scientific controversies, for example the failure of new evidence to have any significant impact on continuation of the controversy. Therefore, it is safe to predict that these panics will not go away soon. Campaigners who are concerned about the injustices involved in "wars" on crime, drug and terror need to accept that logic and evidence are unlikely to make much difference, and to address the driving forces behind these persistent panics.

That said, addressing driving forces is a massive challenge, and even agreeing about what these driving forces are is likely to be difficult. All that can be done here is to note that a key feature of persistent panics is othering, including the stigmatisation of opponents, the folk devils. The categorisation of certain groups as enemies helps to foster solidarity within the in-group, with the consequence that there is an incentive to maintain an alarm. One counter to this process is fostering dialogue. For example, rather than stigmatising unvaccinated individuals and vaccine critics, engaging in respectful conversations may have more potential.[59] The development of principles for challenging persistent panics remains to be done. That these panics have continued for decades, despite the efforts of many campaigners in a range of domains, shows that the challenge is enormous.

Acknowledgments: Thanks to Jason Delborne, Julia LeMonde, Sarah Monod de Froideville, Stephen Holden, and especially two anonymous reviewers for many valuable comments and suggestions.

[59] Julie Leask, Paul Kinnersley, Cath Jackson, Francine Cheater, Helen Bedford and Greg Rowles, "Communicating with parents about vaccination: A framework for health professionals," *BMC Pediatrics* 12, no. 154 (2012): 1–11.