

A Defense of Compulsory Vaccination

by Jessica Flanigan (2014)

A Defense of Compulsory Vaccination

A recent increase in vaccine refusal has contributed to a breakdown of herd immunity against communicable diseases. By compromising herd immunity, vaccine refusal has increased the rates of transmission for diseases like pertussis, measles, and mumps.¹ My thesis is that most people are not entitled to refuse to be immunized against diseases such as these because doing so violates the rights of others to not be infected with contagious illnesses.

My argument can be stated as such: vaccine refusal harms and risks harming innocent bystanders. People are not entitled to harm innocents or to impose deadly risks on others, so in these cases there is little to be said for the right to refuse vaccination. Compulsory vaccination is therefore justified because non-vaccination can rightly be prohibited, just as other kinds of harmful and risky conduct are rightly prohibited. There may be practical reasons to refrain from prohibiting non-vaccination, but compulsory immunization requirements are nevertheless justified.

Vaccination is a notoriously controversial debate, and while I do not expect that the following defense of compulsory immunization will avoid this controversy, I construct this argument to rely on a minimum of controversial normative premises. In particular, I do not assume any particular moral theory or that public health concerns can justify coercive policies in general. Instead, my argument relies on the relatively uncontroversial principle that it is wrong to harm others by transmitting a contagious illness that they were not liable to incur. To begin, I develop an analogy between non-vaccination and random gunfire that illustrates this point.

I then argue that the gunfire analogy succeeds despite some seeming differences between the two cases. I therefore conclude that vaccination can be permissibly required in cases where four conditions are met: (1) the illness is contagious; (2) those who are exposed to the risks of transmission are not liable; (3) vaccination is necessary and effective at limiting contagious transmission; and (4) vaccination does not violate rights of self-defense. When these four conditions are met there is little to be said for the right to refuse vaccination. This argument provides a principled defense of compulsory immunization policies like those in the United States.

Next, I consider the claim that religious freedom can justify non-vaccination and the claim that the right to refuse medical treatment justifies non-vaccination. I show

¹ At this point, the diseases I am referring to include those like pertussis, measles, mumps, rubella, diphtheria, haemophilus influenza, hepatitis A, meningococcal disease, chickenpox, and rotavirus. I do not include diseases like HPV or tetanus, for reasons that I explain in more detail later in this essay.

that religious freedom and rights of bodily integrity do not entitle people to refuse vaccination. ...

By reframing vaccine refusal as harmful and unlawful conduct my aim is to shift the focus of the vaccine debate from non-vaccinators' religious and refusal rights to the rights of others to not be infected with contagious illnesses. Religious freedom and rights of informed consent do not entitle non-vaccinators to harm innocent bystanders, and so coercive vaccination requirements are permissible for the sake of the potential victims of the anti-vaccine movement.²

An Analogy

It's Independence Day. You are sitting outside your house and watching fireworks. Several patriotic neighbors begin shooting guns in the air to celebrate. It is unlikely that a stray bullet will hit you, but you realize that if one does it could be deadly. Frightened by the gunfire, you make your way inside. As you run to your door a bullet lodges in your shoulder.

In this case, the shooter has done something wrong. Of course, the shooter may not know that he did something wrong. He may hear the sirens down the block and assume that your injury is unrelated to his behavior. For example, he may assume that some other shooter's bullet struck your shoulder, or that you were injured in some other way. Even if the shooter knew that it was his bullet, he may still deny any wrongdoing. He may argue that he did not intend to shoot you, that he could not have foreseen this consequence, that the odds of you getting shot by him were extremely low, and that he was merely exercising his right to own and fire a weapon.

Yet, the shooter's defense of his conduct would fail. The fact would remain that his bullet is in your shoulder because of something he did and, at a minimum, he would be subject to charges of reckless endangerment. In some jurisdictions, indiscriminate shooters can even be charged with murder if their gunfire kills someone.³ Even if the shooter's bullet never hit your shoulder, he could still be liable to criminal penalties simply for randomly shooting into the air.⁴ In Arizona, for example, random gunfire is a felony offense, and in several other states celebratory gunfire is a misdemeanor that is punishable by jail time and fines, even if the gunfire never harms anyone.⁵

² This argument provides a stronger philosophical foundation for a set of policies that are increasingly supported by healthcare practitioners and which have been endorsed in part by the American Medical Association. See Omer and Pan (2006).

³ LAPD: Fourth of July Gunfire Reduction Program http://www.lapdonline.org/search_results/content_basic_view/7751.

⁴ In the US, laws against aerial firing vary by state. In some places it is classified as disorderly conduct and in other states it is considered reckless endangerment.

⁵ Several states have sought to increase penalties for aerial firing that causes harm and to improve enforcement of existing laws. For example, in Maryland where 10-year-old Aalyiah Boyer was killed by celebratory gunfire on New Year's Day in 2013, Boyer's family is currently lobbying for harsher penalties for celebratory gunfire. The Arizona classification of

Now consider an analogous case. You attend a party on Memorial Day with your children. Several other neighborhood families bring their children to celebrate as well. You know that there is some chance that the neighbors' children are not vaccinated. Someone is coughing and gasping, and you recognize the sound as whooping cough. Though you realize that it is unlikely that you or your children will get pertussis, just to be sure you gather your children and leave the party. Ten days later your son, who has been vaccinated, starts coughing and gasping. He is diagnosed with pertussis and the cough lasts for two months even with antibiotic treatment. During that time he cannot sleep well, cannot attend school, and is generally miserable. The pediatrician explains that the pertussis vaccine is only 70–85% effective, and that transmission rates are high because many adults do not receive pertussis boosters and some parents do not give their children pertussis vaccines for religious or other conscience-based reasons.

As in the case of celebratory gunfire, the non-vaccinators harm and impose risks on their neighbors. In both cases, the shooters and the non-vaccinators may never see the harm they cause to others. Both shooters and non-vaccinators may feel justified in exposing people to small risks of getting shot or infected with a contagious illness for the sake of their own freedom to fire guns or to refuse vaccination. Yet, neither shooters' nor non-vaccinators' rights entitle them to harm others, despite the fact that the risk of harm is of low-probability, their victims are unlikely to identify them, and they do not intend to injure their victims.

At this point, it is worth describing in more detail the ways that non-vaccinators harm and impose risks on others. First, non-vaccinators are more likely to acquire and transmit contagious illnesses. Second, vaccine refusal diminishes herd immunity, which harms people in the community by making everyone more vulnerable to contagious transmission. Third, non-vaccinators are especially harmful to immunosuppressed people and infants who cannot receive effective vaccination. The harms of non-vaccination are especially objectionable because non-vaccinators do not exclusively bear the costs of the harms they cause. Rather, they externalize the costs of non-vaccination to bystanders who are not liable to be harmed by contagious transmission.

Recent Pertussis and Measles outbreaks illustrate how non-vaccination contributes to contagious transmission. For example, 214 children were affected by a measles outbreak in the United States in 2011, and 13% of those children were too young for vaccination and were infected by unvaccinated children (Unvaccinated Behind Largest U.S. Measles Outbreak in Years 2013). In April 2013, more than 30 cases of measles were reported in Brooklyn, New York, causing two hospitalizations, one miscarriage, and one case of pneumonia (Ali and Weichselbaum 2013). In 2012, there were a record 2,000 cases of measles reported in the UK, and by May 2013,

celebratory gunfire as a felony offense was enacted as part of "Shannon's law," a statute named after a 14-year-old girl who was killed by a stray bullet in 1999.

there were already 1,200 reported cases (Cheng 2013). Public health officials attribute these outbreaks to parents' refusal to vaccinate their children against measles. The decision to refuse vaccination is often based in unfounded fears about autism and the measles, mumps, rubella (MMR) vaccine (DeStefano et al. 2013). Measles can be deadly. In 2011, 158,000 people in the world died of measles (WHO Fact Sheet—Measles 2013). Children who contract measles can die from pneumonia or measles encephalitis, and it is especially dangerous for people who have limited access to health care or adequate nutrition. Vaccination effectively prevents measles deaths. From 2000 to 2011 measles deaths fell worldwide by 71% because of vaccination programs (Global Control and Regional Elimination of Measles, 2000–2011 2013).

Rates of pertussis (whooping cough) are also on the rise. Infections peaked in 2012 with more than 41,000 cases reported to the Centers for Disease Control (CDC), including 18 pertussis-related deaths (CDC—Pertussis: Outbreak Trends 2013). Most of these pertussis-related deaths were among children who were too young to receive the vaccine and relied on others' compliance with vaccination recommendations to prevent transmission.

These recent outbreaks also exemplify how undermining herd immunity through non-vaccination can be harmful (Omer et al. 2008, 2009; May and Silverman 2003). The pertussis vaccine is not 100% effective, so even the vaccinated population can be harmed when others refuse vaccines. To illustrate this point, imagine a vaccine that only protects a person from contagious illness in 90% of cases. Vaccinating an entire population will prevent the spread of the illness because only 10% of those exposed will become infected. However, if some people go unvaccinated, greater than 10% of the exposed population will become infected. When a higher percentage of the population is infected, a contagious illness is also more likely to spread because a greater number of people are exposed to the illness. In this way, failing to become vaccinated not only increases health risks for the unvaccinated population, it also increases the risk that those who are vaccinated will contract a contagious illness (Anderson and May 1985). When more people go unvaccinated, more vaccinated people become sick as well.

An unvaccinated population is especially dangerous for immunosuppressed people. For example, newborns, chemotherapy patients, organ transplant recipients, and people with HIV cannot effectively inoculate themselves against contagious transmission because vaccines do not work on their compromised immune systems. The consequences of transmission are also much worse for the immunosuppressed than they are for others. This means not only that immunosuppressed people face extreme health risks because others go unvaccinated, but also that they are excluded from using services or going places that would potentially expose them to contagious illnesses. Consider Stephanie Tatal's account of finding daycare for a child with leukemia:

Last year, while searching for child care for our 2-and-a-half-year-old son, my husband and I thought we had we found the perfect arrangement... but when I asked: “Are any of the children here unvaccinated?” the hope of my son’s perfect day care experience burnt to a little crisp. As it turned out, one child had a philosophical or religious exemption... Ordinarily I wouldn’t question others’ parenting choices. But the problem is literally one of live or don’t live. While that parent chose not to vaccinate her child for what she likely considers well-founded reasons, she is putting other children at risk. In this instance, the child at risk was my son (Tatel 2009).

The unvaccinated parents put Tatel’s child at risk because children with leukemia have very low white blood cell counts, and thus they are easily hospitalized by small illnesses. Returning to the gunfire analogy, this is like a situation where parents cannot walk their children to the park for fear of their neighbor who fires guns in the air every afternoon. The shooter’s risky behavior, like the behavior of non-vaccinators, imposes real costs on families who must rearrange their lives to avoid being injured by their negligent neighbors.

Testing the Analogy

If the analogy succeeds, it suggests that mandatory vaccination policies are permissible—which is to say coercion can be used to promote vaccination—because non-vaccinators are not entitled to harm or risk harming non-liable bystanders, just as shooters are not entitled to harm or risk harming their neighbors.

Opponents of mandatory vaccination policies may resist this analogy at several points. One may argue that contagious transmission is a natural occurrence ..., whereas bullets falling from the sky is a result of human behavior, and that people are therefore entitled to demand a gunfire-free community but not to make demands on nature Or, vaccination opponents may argue that the risk of being harmed by an unvaccinated person, especially in light of herd immunity, is very small. Critics of vaccination requirements may also argue that any individual’s contribution to the harm or risk of harm that is posed by non-vaccination is negligible, so individuals do nothing wrong by refusing vaccination. In the rest of this section, I will show that these attempts to resist the analogy fail, and that non-vaccination is indeed harmful in the same way that random gunfire is harmful.

First, consider the claim that non-vaccination is morally different from celebratory gunfire because we are not entitled to a disease-free community when disease is a natural occurrence Or, perhaps those who oppose vaccines could make the argument that gunfire and transmitting a disease are different because we do not have rights against being harmed by natural events like diseases, earthquakes, or epidemics. It may be true for diseases that do not result from human negligence or maleficence that they are a part of nature, just like falling rocks. However, when a

disease can be prevented by immunization, the transmission of the disease cannot be solely attributed to nature but is also attributable to someone's failure to prevent transmission, just as falling bullets are attributable both to human action and gravity.

... When British soldiers distributed smallpox infected blankets to the Shawnee and Delaware tribes during the siege of Fort Pitt and at other times in the eighteenth century, they violated the rights of the tribes' members even though smallpox was a naturally occurring disease (Fenn 2000). Even non-maleficent cases of disease transmission can be wrong. If a person negligently infects an uninformed partner with a sexually transmitted disease, or if a company exposes unknowing workers to carcinogenic chemicals, they have also violated people's entitlements to a disease-free environment, even if people do not have general rights against STD's or cancer (Harris and Holm 1995). ...

Non-vaccinators may also resist the gunfire analogy on the grounds that the risk of being harmed by an unvaccinated person, especially in light of herd immunity, is very small, unlike the risk of being hit by a stray bullet. We can imagine, however, that the risk of being hit by a stray bullet is also very small but that random gunfire is wrong and rightly prohibited nevertheless. One reason that public policy can limit random gunfire or non-vaccination is that even small risks become morally significant when they are taken many times and the overall potential for harm outweighs the low probability of harm actually happening in any single case. Small risks are also morally significant when the potential harm affects a lot of people.⁶ Non-vaccination can take this form. Even if a single non-vaccinator's choice does not impose significant risks on many people, as an increasing minority makes a risky choice the pool of people who are exposed to the risks of transmission becomes greater, so the risk of non-vaccination becomes more significant. Furthermore, even a single non-vaccinator imposes small risks on people who have high stakes. If an unvaccinated person transmits a contagious illness to someone who is immunosuppressed, such as a cancer patient or an infant, the consequences can be deadly. ...

A related asymmetry between celebratory gunfire and non-vaccination is that a single unvaccinated person's contribution to reducing the harm or risk of harm posed by the entire unvaccinated population is especially small, given high rates of vaccine refusal. We can modify the celebratory gunfire case to better reflect this seeming asymmetry simply by increasing the number of neighbors who fire weapons. Adding more people to the group that poses a threat to innocents may

⁶ Ignoring small chances is what Parfit calls the third mistake in moral mathematics (Parfit 1984). Parfit argues that we cannot ignore small chances when the stakes are very high or when the chance will be taken many times because the large potential harm/benefit cancels out the smallness of the chance. His example is nuclear science. He writes that a scientist may not consider a one in a million chance of killing one person with a nuclear device, but that when people design reactors they must consider the one-in-a-million chance of killing one million people. In that case a one-in-a-million chance is not so small after all because the stakes are very high.

make any one individual's contribution to the threat less substantial, but that shooter nonetheless poses a threat in that his bullet could be the one that lodges in your shoulder.

If anything, the harm of non-vaccination is even worse than the harm of celebratory gunfire, because part of the harm, in addition to the harm of transmission itself, is the harm of decreased herd immunity. Unlike celebratory gunfire, non-vaccinators not only are more likely to transmit an illness, they make it more likely that others will transmit harmful diseases as well. Non-vaccinators may reply that their specific contribution to herd immunity is insignificant, that it is so negligible that one individual's failure to vaccinate does not actually make anyone worse off. Yet, just because the effect on herd immunity is small or imperceptible does not mean that it is not harmful. Actions that have very small effects, like overfishing or imposing small traffic delays on others, can be extremely harmful in aggregate (Parfit 1984). And, just as every fisherman in fact has an effect on overfishing by taking fish out of the water, each non-vaccinator has an effect on undermining herd immunity by taking himself out of the pool of inoculated citizens.

The idea that people have rights to not be subjected to serious risks without their consent requires that we define a baseline level of acceptable risk. Not all small risks merit moral consideration. We impose small risks on people every day. Every driver risks killing an innocent person but I am not suggesting that driving should be prohibited. Part of what should determine whether an activity imposes undue risks on others is the costs of avoiding those risks and one's reasons for imposing the risks. For some vaccines, the risk of non-vaccination may be so small (e.g., if the disease has been eradicated) that compulsory immunization is not warranted. But the earlier examples of recent outbreaks show that, at least in some cases (pertussis, measles), the risks of refusal are significant and that innocent people die because of non-vaccination. In the next sections, I will show that the reasons for avoiding the risks of transmission and threat to herd immunity associated with vaccine refusal cannot be justified on the basis of most reasons that are given. ...

The risks posed by vaccine refusal are also more morally significant than other small risks that we collectively impose on others, like the risks associated with pollution because a single refusal is theoretically sufficient for transmitting an illness and harming or killing an innocent.⁷

Vaccination Requirements

Begin with the assumption that a prohibition on celebratory gunfire is permissible. Since non-vaccination is morally similar to celebratory gunfire in that it harms

⁷ Walter Sinnott-Armstrong, for example, claims that individuals are not responsible for the risks they impose on others by contributing to climate change. This case is not analogous to the risks associated with being unvaccinated because being unvaccinated is sufficient to cause harm whereas a single individual's contribution to climate change is not sufficient for harm (Sinnott-Armstrong 2005).

people and exposes bystanders to undue risks of harm, non-vaccinators are liable and some coercive intervention to prevent or limit the effects of their wrongful behavior is justified. And so, prohibitions of non-vaccination are permissible, just like other coercive public safety measures. In practice, this means that mandatory vaccination policies are permissible.

The idea that coercion is justified to prevent the spread of preventable contagious illnesses is not new. Quarantine is a limitation on a potentially contagious person's behavior for the sake of public safety. In the case of quarantine, the cost to the individual of preventing transmission is typically higher than in the case of non-vaccination because it involves isolation rather than an unwanted injection or medication. On the other hand, the risks posed by contagious people who are subject to quarantine are also higher. Though the individual costs and public safety benefits of compulsory vaccination and quarantine are different in degree, they are not different in kind.

To illustrate the parallel between justified quarantine and mandatory vaccination, consider the case of "Typhoid Mary" Mallon, an asymptomatic carrier of typhoid who infected dozens of people and killed 3 during her career as a cook in the first half of the twentieth century. Mallon refused to have her gallbladder removed (to prevent the spread of typhoid) and denied that she had the disease despite the fact that she tested positive for typhoid salmonella. Eventually Mallon was quarantined and then re-quarantined after she repeatedly failed to comply with authorities' recommendations that she practice good hygiene, wash her hands, and discontinue work as a cook.

Typhoid Mary's behavior provides an illustrative parallel to the behavior of those who refuse vaccines. Although any particular unvaccinated person is unlikely to infect or kill as many people as Mallon did, the threat that he or she poses is the same, especially considering that there are many more non-vaccinators than Typhoid Marys. Through their own willful ignorance, negligence, and resistance to public health authorities, both Typhoid Mary and non-vaccinators deliberately endanger and potentially harm people by transmitting contagious illnesses, essentially turning themselves into biological weapons that are recklessly unleashed on a public that cannot consent to the risks. And in this way, both Mallon and non-vaccinators make themselves liable to coercive intervention because of the potentially harmful consequences of their behavior.

Those who refuse vaccines do not have the right to do so in cases where their conduct exposes others to undue risks and harms. This principle places some limits on the permissible scope of mandatory vaccination; not all failures to vaccinate are risky or harmful to people who are not liable to be exposed to those risks or harms. Mandatory vaccination can only be justified for these reasons when the following four conditions are met:

- (1) Vaccination prevents a contagious illness.
- (2) Those who are exposed to the illness do not make themselves liable to the risks.
- (3) Vaccination is potentially effective at limiting contagion.
- (4) Vaccination does not limit rights of self-defense or defense of others.

These four conditions limit the scope of permissible compulsory vaccination policies. Take condition 1—the tetanus vaccine, for example, prevents an illness that cannot be spread between people. In this case, vaccine refusal is not harmful to others because it does not increase the odds that an unvaccinated person will transmit tetanus nor does it reduce herd immunity for tetanus.⁸

Mandatory vaccination policies for some contagious illnesses may also be more difficult to justify than the vaccines for diseases like measles, mumps, or pertussis. For example, vaccines that protect people against sexually transmitted infections like hepatitis B (HBV) or human papillomavirus (HPV) cannot be as easily justified on the grounds that the victims of transmission are not liable to transmission, because by consenting to sex people plausibly consent to some of the risks.⁹ Unlike airborne illnesses, sexually transmitted diseases can be avoided through abstinence or by requesting that partners be tested. The right to not be infected is even weaker if a person has sex with a woman who has HPV and she disclosed her status. In any conditions where a person knowingly consents to the risk of transmission condition 2 may not be satisfied. By consenting people can waive their entitlement against contagious transmission.¹⁰ For this reason, further argument is necessary to show that either abstinence or testing is too burdensome for people who seek to avoid transmission, or that even with the option of abstinence and testing people who have sex are not liable to be infected with sexually transmitted diseases.

Condition 3 states that vaccination requirements must effectively limit the risks of contagion. If vaccines are not effective at protecting people from being harmed by contagious transmission then compulsory vaccination requirements cannot be justified. This principle holds in cases where particular vaccines have been shown to be ineffective or outdated, and it also holds when vaccines are unlikely to be effective for particular patients. For example, since vaccines are not effective at

⁸ This consideration may tell in favor of unbundling tetanus vaccines from vaccines for contagious illnesses, if vaccination opponents seek to minimize the number of vaccines they receive.

⁹ The argument in this essay therefore cannot justify the current practice of requiring the HBV vaccine as a condition of public schooling, nor can it support an HPV vaccine mandate. The above argument for exemptions from HBV and HPV vaccine mandates is somewhat complicated by the fact that teenagers and children are required to receive them but may not be able to consent to the risks associated with sex. Here I am assuming that if a person can consent to sex she can consent to the risks associated with having unprotected sex without vaccinations for HBV or HPV. Since arguments for the HBV or HPV vaccines cannot be justified for public safety reasons, and argument for these vaccine mandates must therefore rely on some theory of why parental rights do not entitle parents to refuse vaccinations for their children or appeal to paternalistic considerations (Colgrove 2006; Haber et al. 2007).

¹⁰ Similarly, when health workers voluntarily treat people who have contagious illnesses they too consent to an increased risk of contagious transmission. This consideration will not tell against mandatory vaccination for health workers, however, because even if health workers do consent to the risks of infection, those who they may subsequently infect if they do become sick cannot consent to those risks, nor can other patients who interact with an unvaccinated person. In this way, my argument actually tells in favor of potentially higher vaccination requirements for health workers because the potential for harm is greater, as I argue in “Practical Considerations” section.

protecting immunosuppressed patients from infection and transmission, a policy that required leukemia patients to become vaccinated cannot be justified for the sake of public safety.

Condition 4 is a conditional claim. If it is permissible to impose some risks on innocent bystanders in self-defense, then refusing an effective vaccine because the patient is severely allergic to the vaccine or a vaccine component is also permissible. In these cases, rights of self-defense can outweigh others' rights against the risks of contagious transmission. Just as other public safety policies make exceptions for cases of self-defense, mandatory vaccination policies should not require people to expose themselves to serious medical risks for the sake of public safety. In rare cases, it may be permissible for an individual to expose others to risks of harm in order to defend herself.

Return to the gunfire analogy. Imagine a bear is chasing your neighbor and the only way that he can scare the bear away is to randomly fire a weapon in the bear's general direction. By firing, he risks harming you or the other neighbors, but his decision to fire no longer reflects an ideological commitment or a philosophical judgment, but an attempt to preserve his own life in the face of a natural threat. Some have argued that the neighbor could permissibly endanger innocent bystanders for the sake of self-defense in this case.¹¹ If they are right, then in cases where people are "under attack" by diseases that make vaccination itself a direct threat to the individual's health she may permissibly refuse to comply with vaccination requirements and thereby expose others to potential harm.

On the other hand, self-defense rights are not absolute and it is also plausible that your neighbor should have complied with a prohibition on random gunfire when he was under attack. The permissibility of risking others' safety will depend on the severity of the risk to others and the severity of the threat from the bear. Similarly, my claim here is only that self-defense could potentially permit people to expose others to some risks of harm for the sake of self-preservation, when the risk to others is small relative to the harm of the vaccine. I am skeptical that all self-defense justifications for exemptions from vaccination requirements can succeed, but severe allergies can count as serious enough harms to justify exemptions. Still, these kinds of medical exemptions would not justify non-medical vaccination-refusals, which account for most of the growth of the unvaccinated population (Omer et al. 2012).

¹¹ It is controversial whether it is ever permissible to kill innocents for any reason (Otsuka 1994). Those who argue that it is permissible to kill innocents in self-defense generally limit this to innocent aggressors or innocent threats (Thomson 1991). However, when self-defense (or other-defense) only imposes risks on others, rather than certain harm, it can be permissible (and may even be required in the case of other-defense) to expose innocents to small risks (McMahan 2010).

Condition 4 also allows for potential exemptions in cases where vaccination can harm others.¹² The only case where this condition is relevant is vaccination requirements for pregnant women. Women who are pregnant should not be required to receive live virus vaccines like the MMR vaccine, which poses a theoretical risk to the health of the fetus. On the other hand, the principle that pregnant women should not harm their unborn and newborn children supports vaccination requirements during pregnancy for diseases like pertussis, which is potentially transmitted to newborns by unvaccinated parents (NCIRD 2013).

Importantly, this argument for compulsory vaccination relies on a relatively uncontroversial moral premise that it is wrong to harm people and that coercion can be used to some extent to prevent harm. This position is compatible with a range of positions on the permissibility of state coercion. Unlike many other coercive public health policies, mandatory vaccination requirements do not require that we accept the permissibility of paternalistic interventions because they do not aim to ensure that people make healthy choices or that they refrain from undermining their own health.¹³ Nor does this argument for mandatory vaccination rely on an argument about whether people who make unhealthy choices place burdens on the public health system.¹⁴ Rather, this argument relies only on the principle that coercion is justified to prevent people from harming others and imposing serious risks on others. This justification for compulsory vaccination does not require that we assume that the state is uniquely justified in enforcing immunization requirements or that we assume that the state has any special authority at all.¹⁵ For my argument to succeed I need only assume that state actors, or any individual, can coercively intervene to prevent others from engaging in behavior that is wrong or harmful to others. Since non-vaccination often meets this criteria, coercive immunization requirements can be justified. Conservatives, liberals, egalitarians, libertarians, and even anarchists can endorse this minimal condition for permissible coercion.

¹² Just as self-defense can justify imposing some risks on innocents, so can defense of others (McMahan 2010). In the case of other-defense, one may even be required to impose risks on innocents if the benefit to another is significant enough.

¹³ Paternalists argue that it is permissible to coerce people for their own benefit as long as the coercive policy does not limit important freedoms (Wilson 2011). Yet, paternalism is at odds with other central principles of medical ethics, like the doctrine of informed consent, so proponents of public health paternalism must therefore explain why non-consensual interventions are permissible when they affect an entire population but impermissible in the clinical context. I doubt that any defense of coercive paternalism will succeed, so I do not rely on paternalistic framework to justify mandatory vaccination.

¹⁴ This justification for public health interventions is sometimes framed as a variant of the harm principle. The idea is that unhealthy citizens harm the healthy by making healthcare more expensive and burdening the healthcare system. However, it is difficult to explain just how healthy citizens are harmed on this account. If unhealthy people have a right to receive healthcare then citizens who subsidize their healthcare are not harmed, they are merely being asked to comply with their antecedent duties to provide healthcare to all people. If unhealthy people have no right to healthcare then taxpayers and policy makers could rightly refuse to provide them with emergency service or healthcare. If so, citizens are neither forced or morally required to provide health benefits to unhealthy citizens, so they cannot claim that they are harmed by the burdens that unhealthy choosers place on the public healthcare system. Either way, the harm principle cannot justify public health policies on the grounds that unhealthy citizens harm their compatriots by burdening the healthcare system.

¹⁵ Political anarchists hold that state coercion is only justified in those cases where it would be justified for an individual to exercise the same kind of coercion for the same purpose (Huemer 2012). Although I focus on political solutions to non-vaccination, my argument is compatible with this framework as well. Voluntary associations and individuals could also permissibly exercise coercion to ensure mass immunization.

Bodily Integrity and Religion

At this point, one may accept that non-vaccination is relevantly similar to indiscriminate gunfire in that it harms people and exposes others to risks of harm, but deny that mandatory vaccination policies can be justified. For example, many opponents of vaccination have philosophical or religious objections to the practice of immunization, and will argue that mandatory vaccination policies are discriminate and that they violate their religious freedom, even if the exercise of those rights is harmful (May and Silverman 2005). Others oppose compulsory vaccination on the grounds that it violates their medical autonomy (Hodges et al. 2002). Proponents of this view may argue that just as freedom of speech sometimes means that people are made worse off by others' speech, or freedom of association can cause some groups to be excluded from groups they may want to join, so too does freedom of religion and each person's general right of bodily integrity allow some people to make others worse off by exercising those rights.

Can rights of bodily integrity justify vaccine refusal? Some critics of mandatory vaccination see vaccine requirements as a violation of people's rights of informed consent (Informed Consent—National Vaccine Information Center 2013). I grant that informed consent is an extremely powerful constraint on the conduct of medical professionals and policy makers. Paternalistic coercive medical interventions are wrong even when a patient's choice is clearly inadvisable. As I have argued elsewhere, informed consent even justifies a right to access medical treatment in many cases in addition to the right to refuse (Flanigan 2012). But the principle of informed consent does not go so far as to justify harming others with one's medical choices (O'Neill 2004). Just as patients' rights do not entitle a person to willfully contract a contagious illness and expose others to the risks of transmission, informed consent does not entitle patients to expose others to the risks of transmission with their refusal choices.

In addition to concerns about medical consent, some people have deep philosophical and religious objections to vaccination. Conscientious vaccine refusers claim that they cannot accept coercive vaccination policies given their religious or philosophical beliefs, so mandatory vaccination requirements cannot be justified to those subject to them and are therefore unjust.¹⁶ Some public health ethicists and legal scholars echo this concern and emphasize the need to include religious and other conscientious perspectives in public health deliberations as a condition for legitimate policy making (Solomon and Abelson 2012; Aspinwall

¹⁶ This objection draws on a long tradition, most commonly associated with John Rawls's *Political Liberalism*, which holds that public policy must be justifiable to those who are subjected to it on reasons that they can affirm in their own religions or conceptions of a good life (Rawls 2005). Political liberals do not claim public policy should be justified to each person in terms they can accept because they believe that religious groups are likely to be correct. Nor is political liberalism justified by empirical assumptions about the wisdom of crowds or the potential instability of forcing a controversial policy on religious groups. Rather, political liberals hold that whether a policy is itself a just policy will depend on whether those subject to it can find reasons internal to their own values to accept it.

1997). Can such a principle of public justification be used to justify religious and philosophical exemptions from mandatory vaccination policies? Return to the gunfire analogy again. The shooter might claim that he had strong cultural or philosophical reasons for celebrating Independence Day with gunfire. Perhaps he is a deeply committed member of the National Rifle Association and associates guns with freedom, or his conception of patriotism involves reenacting revolutionary gunfire. We can imagine people who are as deeply committed to gun culture as others are to religion. And a minority of them may judge that celebratory gunfire is an important part of that culture. Gun lovers like these may not be able to see any reason to accept a ban of celebratory gunfire internal to their own comprehensive doctrine. Yet, banning random gunfire is still a justifiable policy, even if it is not justifiable to some gun lovers. Similarly, prohibiting religious citizens from turning themselves and their children into biological weapons is a justifiable policy even if religious citizens cannot see it that way.

This reply highlights deeper problems with allowing religious exemptions to vaccination requirements. For example, proponents of these exemptions will generally agree that justifiable public policy need not accommodate disagreement that stems from factual ignorance; for example, no states offer legal exemptions for people who are skeptical about the science of vaccines. But if states can discount the views of citizens who oppose vaccination only because they are misinformed about the science behind vaccines we may then ask why states cannot also discount the views of people who have false beliefs about what justice requires, such as those who wrongly believe that an ethical life requires vaccine refusal.¹⁷ One may reply that it is unreasonable to discount others' views and impose a particular theory of justice, like the view that one should not harm others by refusing vaccination, on those who disagree. Yet, the alternative is that the state sides with those who are *mistaken* about the ethics of vaccine refusal. Either way citizens are subject to public institutions that reflect a particular moral judgment (Davis 2012). And if the state *must* side either with opponents of vaccination or vaccine advocates, it should side with the group that is correct about the ethics and science of vaccination and against non-vaccinators.

Aside from these concerns about public justification, another reason to consider exemptions from vaccination requirements for people with conscience-based objections to the practice is that conscientious vaccine refusers may experience the requirements as a kind of harm or trauma. If a person being legally required to do the right thing offends against her deepest commitments, one may be tempted to say that she has a right to do wrong in such a case. This consideration does recommend against forced vaccination, but it does not tell against fines for non-vaccination and exclusion from public benefits and some forms of employment. Even if it would be excessively traumatic to use violence and force to compel a

¹⁷ This is a version of Richard Arneson's more general rejection of political liberalism (Arneson 2000).

person to violate her religious convictions, it is sometimes permissible to impose targeted costs on people who threaten others. This reply assumes that fines and exclusions from public benefits are not experienced as the same level of trauma as being forced to violate one's deeply held religious convictions.

One may question why the harm of vaccination to an allergic patient can justify an exemption from vaccination requirements, while the harm of vaccination to a religious patient cannot. Yet, this asymmetry is reflected in other legal norms. In some cases, people can impose risks on others to preserve their own lives or health. Yet, in no other cases do religious or philosophical commitments entitle people to harm or threaten people in their community. Proponents of religious and philosophical exemptions have relied on a mis-framing of what non-vaccination entails to justify their position. Non-vaccination has been mistakenly characterized as a personal, self-regarding medical choice or as a decision about children's health that parents were entitled to make. I agree that people are entitled to make *self-regarding* medically inadvisable decisions on religious or philosophical grounds—Jehovah's witnesses have the right to refuse life-saving treatment and everyone has the right to end their own lives. But religious and other reasons of conscience cannot justify practices that impose risks on the community through practices like random gunfire or non-vaccination.

Practical Considerations

Although there is no principled reason to refrain from enforcing mandatory vaccination policies, there are several practical objections to mandatory vaccination that merit consideration in crafting an immunization policy. For example, non-vaccinators may see compulsory vaccination policies as so harmful and invasive that they will refrain from seeking medical care for themselves and their children. Or, compulsory vaccination policies may effectively empower the state to do too much. If there were evidence in support of these hypotheses then that would be a good reason to withhold support for mandatory vaccination policies despite the fact that they often are justified in principle. These concerns also tell in favor of adopting a minimally coercive approach to ensuring vaccine compliance. We should be wary of resisting a justified public policy on the grounds that people will do more impermissible things if wrongful conduct is prohibited, while taking seriously the concern that an overly intrusive immunization could also be unjustified, even if non-vaccinators are liable to some state interference.

The remainder of this essay sketches some considerations that could potentially inform a vaccination policy in practice. The aim of any mandatory vaccination policy is to achieve widespread vaccination among the eligible population. Those who fail to vaccinate themselves and their children are liable to some coercive interference because their conduct wrongfully harms and imposes risks on others. Yet, just as shoplifters are liable to coercive legal penalties, but it would be

impermissible for the state to cut off their hands, not all coercive policies are permissible for the sake of compliance with vaccination requirements. To take an extreme example, it would be wrong for governments to kidnap, restrain, and forcibly inject vaccines into unwilling citizens.

Public health officials must therefore walk the line of achieving compliance without exercising unwarranted coercion. Wherever possible, mandatory vaccination policies should be crafted to use the minimum level of coercion necessary to mitigate the harm of non-vaccination and maintain public trust. I therefore propose four policies that could jointly achieve the goal of mass immunization without deploying unnecessary coercion.

- (1) Exclusion from public services: Unvaccinated children can be permissibly excluded from public schools, and unvaccinated adults can be permissibly excluded from other services that require them to interact with the public in order to receive benefits.
- (2) Employment restrictions: Adults who refuse vaccination can be denied employment in some fields, such as health care or food service, to mitigate the chance of transmission.
- (3) Fines: If people do not vaccinate themselves and their children they may be permissibly required to pay a penalty for the risks they impose on others. These penalties could be used to fund public health campaigns to educate people about vaccination or to finance the costs of managing outbreaks.
- (4) Liability for non-vaccination: If public health officials can trace an outbreak to its source, and that source is not vaccinated, then those harmed by the outbreak can sue either the unvaccinated adult or the parents of the unvaccinated child at the source of the outbreak.

These policy proposals acknowledge that states should not exercise coercion that is disproportionate to the harms caused by non-vaccinators but also assume that non-vaccinators can rightly be subjected to some penalties for their conduct.

The first two restrictions, exclusion from public benefits and employment restrictions, are steps designed to mitigate the harm of non-vaccination. Even if people have rights to education or employment, they do not have rights to endanger others by going to public schools or working in a health care context.¹⁸ States can therefore limit those who pose risks to others from accessing public services and

¹⁸ This principle only holds because I am assuming that parents of unvaccinated children (with the exception of those who have medical reasons for non-vaccination) waive their entitlement to public services when they negligently fail to vaccinate their children. If one assumes that all citizens can be reasonably required to pay taxes that contribute to public services, then parents of unvaccinated children who are justifiably excluded from public services are also not entitled to tax rebates on the grounds that they did not use the service. I am grateful to an anonymous reviewer for prompting me to clarify how citizens could be justifiably excluded from public services to which they are otherwise entitled.

employment opportunities, just as public health officials permissibly required that Typhoid Mary refrain from working as a cook as a condition of her release.

Several countries and private organizations have policies like this. New Zealand enforces a policy where unvaccinated children are only required to register as unvaccinated and they are excluded from schools during outbreaks (Dare 1998). In the United States, all public schools require that children be vaccinated unless they have medical, religious, or philosophical objections, depending on the state (State Vaccine Requirements—National Vaccine Information Center 2013). As I argued earlier in this essay, people with religious and philosophical objections have no unique right to harm and impose risks on others, so US states could permissibly require that all children in public schools be vaccinated even if their parents are conscientious objectors, and doing so would increase the benefits of immunization requirements (Robbins et al. 1981). The US model for access to schooling could also be expanded to other public services that require close interaction between people, like public transportation. Implementing such a program would be difficult, and may be unwarranted given the current levels of vaccine refusal, but if vaccine refusal became more widespread and outbreaks increased the policy could be justified in principle.

Health care organizations have also attempted to make vaccination mandatory as a condition of employment (Gilbert et al. 2010; Tilburt et al. 2008). One concern about these policies is that mandatory vaccination for health workers is overly burdensome or coercive because it threatens people with job-loss if they do not consent to immunization. Yet, calling something coercive in itself does not settle whether it is permissible (Pallikkathayil 2011). What matters morally is whether health workers have an entitlement to go unvaccinated in a health care setting where outbreaks are more common than elsewhere and they work with vulnerable populations. In cases such as these, health workers are not entitled to willfully harm or impose serious risks on bystanders, so they are not entitled to keep a job that would enable them to do so. The same goes for workers in other industries where workers interact with a large population. People who interact with the public, like those in retail or commercial food service, may be required to receive vaccinations as a condition of employment given their relatively high potential to transmit illnesses.

Other legal sanctions may be used against the entire unvaccinated population to encourage compliance. For example, those who refuse vaccines can be fined for their negligence, just as fines are issued for random gunfire even if no one is ever harmed by it. Fines can be used to punish wrongful behavior and also to express public disapproval for conduct. In the case of non-vaccination, some punitive measures and disapproval is warranted because the conduct is harmful. Fines can also be used to offset the costs that unvaccinated people impose on the public. Outbreaks of contagious diseases are damaging to the economy. Outbreaks cause

parents to take off work to care for sick children, employees must stay home to avoid further transmission, and insurance providers and patients pay more for medical care. Fines paid by the unvaccinated population, those who likely contributed to the epidemic, can offset some of the costs of managing an outbreak. For example, the cost of providing low-cost and quality medical care for the victims of a contagious epidemic need not be paid exclusively by insurers or equally by all citizens. The unvaccinated population can be asked to shoulder more of the costs of the outbreak they started. In this way, fines need not be classified as entirely punitive but also as a kind of preemptive compensation.

Additionally, if a blameworthy unvaccinated person (or his child) gets a contagious illness like the measles, and transmits it, the unvaccinated person or his parents can be required to pay damages for the harm he has done. For example, if an unvaccinated child gets the measles and transmits it to a newborn baby, and that baby dies, the family of the unvaccinated child should pay damages. Damages are also warranted if the unvaccinated child transmits measles to a pregnant woman and causes a miscarriage or transmits measles to another child and makes that child sick. In all these cases, the unvaccinated child has perceptibly harmed others as a result of his parents' choices. Similarly, employers who employ unvaccinated adults may also be held liable for damages, if their unvaccinated employees harm other employees or customers. The argument for liability hinges on the idea that people should not be legally entitled to refuse vaccination. If vaccine refusal were an entitlement then states could not as easily prosecute families who harmed others by acting within the boundaries of the law. Re-conceptualizing non-vaccination as unlawful behavior enables victims of the unvaccinated to seek damages for the wrongful conduct of their neighbors.

Finally, parents who refuse to vaccinate their children could also be held liable for parental negligence. The analogy to gun use is instructive here as well. If a parent exercises her right to own a gun in a way that endangers her child, by leaving the gun loaded and accessible, for example, she should be held legally responsible for any accidental injuries or deaths that result from the child finding and using the gun. In the US, parents who own guns can be held liable for child endangerment in some cases when injury results from children using guns, and 27 states have child access prevention laws to prevent children from accessing dangerous weapons (Child Access Prevention Policy Summary 2013). Parents should be held responsible for the harm that results from exposing their children to dangerous weapons, whether the harm befalls their own children or others. And this principle is not limited to weapons. Parents should also be held responsible for exposing their children to dangerous diseases and for putting their unvaccinated children in a position where the disease can endanger others.

One may object that punishment for vaccine refusal is unwarranted because those who fail to vaccinate their children have false moral and empirical beliefs that

excuse their behavior.¹⁹ This objection would only have a shot if failure to vaccinate were caused by *non-blameworthy* ignorance. In light of the substantial educational efforts from public health officials and physicians, I am skeptical that false moral and empirical beliefs can excuse refusal in the typical case, but the possibility of excuses on the grounds of ignorance does lend further support for using penalties to finance public health education about vaccines. Physicians should also be educated about how to more respectfully communicate with parents who are skeptical of vaccinations, especially when those patients come from socially marginalized or silenced groups (Navin 2013). That some non-vaccinators can be excused does not, however, justify legal vaccine refusal any more than the possibility that some other harmful acts are excused justifies legal permission to harm others.

Conclusion

I have argued that mandatory vaccination policies can be justified on the grounds that refusing a vaccination is harmful to people in the community. Citizens do not have the right to turn themselves into biological weapons that expose innocent bystanders to undue risks of harm. There are, however, some cases where exemptions may be warranted. If vaccination is likely to be ineffective or if citizens can claim that vaccine refusal is a legitimate act of self- or other-defense, then medical exemptions to vaccine requirements are permissible. Conscientious objectors are unlikely to succeed in justifying vaccination refusal because claims of conscience do not generally entitle people to harm others.

Mandatory vaccination policies are therefore justifiable in most cases because citizens do not have a right to remain unvaccinated. Yet, it does not follow that any level of coercion is warranted in the service of mass immunization. Vaccination policies should be crafted to maintain patients' trust in medicine with the minimum level of coercion that is necessary to achieve mass immunization. I propose that non-vaccinators can be permissibly excluded from public services, certain forms of employment, and forced to pay fines for failure to comply with vaccination requirements. Fines could in turn be used to compensate the victims of non-vaccination, and in some cases non-vaccinators may be asked to pay direct damages to their victims. This proposal allows that a conscientious objector still may be able to avoid vaccination, but mitigates the harm of non-vaccination by classifying vaccine refusal as harmful and unlawful conduct.

¹⁹ Immoral conduct that is done as a result of moral or factual ignorance is only excused if the ignorance is not a result of negligence. If a physician negligently fails to learn about the procedure he is performing, for example, then his ignorance is not an excuse. For moral ignorance, it is even controversial whether blameless moral ignorance can be an excuse (Hieronymi 2008).

References

- Ali, M., & Weichselbaum, S. (2013). Measles 'outbreak' hits two Jewish neighborhoods in Brooklyn. *NY Daily News*. Accessed May 31, 2013, from <http://www.nydailynews.com/new-york/brooklyn/measles-outbreak-hits-jewish-neighborhoods-brooklyn-article-1.1346446>.
- Anderson, R. M., & May, R. M. (1985). Vaccination and herd immunity to infectious diseases. *Nature*, 318(6044), 323–329.
- Arneson, R. (2000). Rawls versus utilitarianism in the light of political liberalism. *The Idea of a Political Liberalism*.
- Aspinwall, T. J. (1997). *Religious exemption to childhood immunization statutes: Reaching for a more optimal balance between religious freedom and public health*. Loyola University Chicago Law Journal, 29, 109.
- CDC—Pertussis: Outbreak Trends. (2013). Accessed May 31, 2013, from <http://www.cdc.gov/pertussis/outbreaks/trends.html>.
- Cheng, M. (2013, May 20). Measles surges in UK years after vaccine scare. NBC News. http://vitals.nbcnews.com/_news/2013/05/20/18376320-measles-surges-in-uk-years-after-vaccine-scare.
- Child Access Prevention Policy Summary. (2013). Law center to prevent gun violence. Accessed May 31, 2013, from <http://smartgunlaws.org/child-access-prevention-policy-summary/>.
- Colgrove, J. (2006). The ethics and politics of compulsory HPV vaccination. *New England Journal of Medicine*, 355(23), 2389–2391.
- Dare, T. (1998). Mass immunisation programmes: Some philosophical issues. *Bioethics*, 12(2), 125–149.
- Davis, R. (2012). Justice: Do it. Working Paper. <https://sites.google.com/view/ryanwdavis/home>
- DeStefano, F., Price, C. S., & Weintraub, E. S. (2013). Increasing exposure to antibody-stimulating proteins and polysaccharides in vaccines is not associated with risk of autism. *The Journal of Pediatrics*.
- Fenn, E. A. (2000). Biological warfare in eighteenth-century North America: Beyond Jeffery Amherst. *The Journal of American History*, 86(4), 1552–1580.
- Flanigan, J. (2012). Three arguments against prescription requirements. *Journal of Medical Ethics*.
- Gilbert, G. L., Kerridge, I., & Cheung, P. (2010). Mandatory influenza immunisation of health-care workers. *The Lancet Infectious Diseases*, 10(1), 3–5.
- Global Control and Regional Elimination of Measles. (2000–2011 2013). Accessed July 17, from <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6202a3.htm>.
- Haber, G., Malow, R. M., & Zimet, G. D. (2007). The HPV vaccine mandate controversy. *Journal of Pediatric and Adolescent Gynecology*, 20(6), 325–331.
- Harris, J., & Holm, S. (1995). Is there a moral obligation not to infect others? *BMJ: British Medical Journal*, 311(7014), 1215–1217.
- Hieronimi, P. (2008). Responsibility for believing. *Synthese*, 161(3), 357–373.
- Hodges, F. M., Svoboda, J. S., & Van Howe, R. S. (2002). Prophylactic interventions on children: Balancing human rights with public health. *Journal of Medical Ethics*, 28(1), 10–16.
- Huemer, M. (2012). *The problem of political authority: An examination of the right to coerce and the duty to obey*. London: Palgrave Macmillan.
- Informed Consent—National Vaccine Information Center. (2013). National Vaccine Information Center (NVIC). Accessed May 31, 2013, from <http://www.nvic.org/informed-consent.aspx>.
- May, T., & Silverman, R. D. (2003). Clustering of exemptions' as a collective action threat to herd immunity. *Vaccine*, 21(11–12), 1048–1051.
- May, T., & Silverman, R. D. (2005). Free-riding, fairness, and the rights of minority groups in exemption from mandatory childhood vaccination. *Human Vaccines*, 1(1), 12–15.
- McMahan, J. (2010). Pacifism and moral theory. *Diametros*, 23, 3–20.

- Navin, M. (2013). Competing epistemic spaces: How social epistemology helps explain and evaluate vaccine denialism. *Social Theory and Practice*, 39(2), 241–264.
- NCIRD. (2013). Pubs/guidelines for vaccinating pregnant women. Accessed May 31, 2013, from <http://www.cdc.gov/vaccines/pubs/preg-guide.htm>.
- O’Neill, O. (2004). Accountability, trust and informed consent in medical practice and research. *Clinical Medicine*, 4(3), 269–276.
- Omer, S. B., Enger, K. S., Moulton, L. H., Halsey, N. A., Stokley, S., & Salmon, D. A. (2008). Geographic clustering of nonmedical exemptions to school immunization requirements and associations with geographic clustering of pertussis. *American Journal of Epidemiology*, 168(12), 1389–1396.
- Omer, S. B., & Pan, W. Y. (2006). Nonmedical exemptions to school immunization requirements: Secular trends and association of state policies with pertussis incidence. *JAMA*, 296(14), 1757–1763.
- Omer, S. B., Richards, J. L., Ward, M., & Bednarczyk, R. A. (2012). Vaccination policies and rates of exemption from immunization, 2005–2011. *New England Journal of Medicine*, 367(12), 1170–1171.
- Omer, S. B., Salmon, D. A., Orenstein, W. A., Patricia deHart, M., & Halsey, N. (2009). Vaccine refusal, mandatory immunization, and the risks of vaccine-preventable diseases. *New England Journal of Medicine*, 360(19), 1981–1988.
- Otsuka, M. (1994). Killing the innocent in self-defense. *Philosophy & Public Affairs*, 23(1), 74–94.
- Pallikkathayil, J. (2011). The possibility of choice: Three accounts of the problem with coercion. *Philosophers Imprint*, 11(16), 1–20.
- Parfit, D. (1984). *Reasons and persons*. Oxford: Oxford University Press.
- Quinn, W. S. (1989). Actions, intentions, and consequences: The doctrine of doing and allowing. *The Philosophical Review*, 98(3), 287–312.
- Rawls, J. (2005). *Political liberalism*. New York: Columbia University Press.
- Robbins, K. B., Brandling-Bennett, D., & Hinman, A. R. (1981). Low measles incidence: Association with enforcement of school immunization laws. *American Journal of Public Health*, 71(3), 270–274.
- Sinnott-Armstrong, W. (2005). It’s not my fault: Global warming and individual moral obligations. *Perspectives on Climate Change: Science, Economics, Politics, Ethics*, 285–307. Amsterdam: Elsevier/JAI.
- Solomon, S., & Abelson, J. (2012). Why and when should we use public deliberation? *Hastings Center Report*, 42(2), 17–20.
- State Vaccine Requirements—National Vaccine Information Center. (2013). National Vaccine Information Center (NVIC). Accessed May 31, 2013, from <http://www.nvic.org/Vaccine-Laws/statevaccine-requirements.aspx>.
- Tatel, S. (2009, October 20). A pox on you. Slate. https://slate.com/articles/health_and_science/medical_examiner/2009/10/a_pox_on_you.html
- Thomson, J. J. (1991). Self-defense. *Philosophy & Public Affairs*, 20(4), 283–310.
- Tilburt, J. C., Mueller, P. S., Ottenberg, A. L., Poland, G. A., & Koenig, B. A. (2008). Facing the challenges of influenza in healthcare settings: The ethical rationale for mandatory seasonal influenza vaccination and its implications for future pandemics. *Vaccine*, 26(Sup.4), D27–D30.
- Unvaccinated Behind Largest U.S. Measles Outbreak in Years. (2013). USATODAY.COM. Accessed May 31, 2013, from <http://yourlife.usatoday.com/health/story/2011-10-21/Unvaccinated-behind-largest-US-measles-outbreak-in-years/50852098/1>.
- WHO Fact Sheet—Measles. (2013). WHO. Accessed May 30, 2013, from <http://www.who.int/mediacentre/factsheets/fs286/en/>.
- Wilson, J. (2011). Why it’s time to stop worrying about paternalism in health policy. *Public Health Ethics*, 4(3), 269–279.