

NONMEDICAL VACCINE EXEMPTIONS: A BALANCE OF RIGHTS

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By

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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EFFECTING SYSTEMIC CHANGE THROUGH LOCAL MEASURES

Though comprehensive management of sociotechnical systems may be infeasible, multiple local components of such systems may be improved to the benefit of the whole system.

In 2019, measles cases reached their highest levels since the disease was eliminated in the U.S. in 2000 (Centers for Disease Control and Prevention, 2019). To control infectious diseases, health agencies must vaccinate every community in the nation. In the U.S., states issue and enforce most public health mandates, and in regulating exemptions, states must balance individuals' rights and health requirements against public health necessities. Measures instituted by local and states governments have primarily local effects, but also impact national public health, especially as local measures compound. Mandatory vaccination for students is a crucial health policy that is common to all states. States differ, however, in their policies towards nonmedical exemptions from these mandates. The sociotechnical research analyzes the ethics of nonmedical vaccine exemptions through the lens of Actor Network Theory, and assesses the potential paths to improve adherence to vaccine mandates.

The security of computer systems nationwide is similarly complex, but the same interconnectivity that leads to this complexity may also enhance the ability of local measures to improve the health of the larger system. According to the Council of Economic Advisors (2018), in 2016 malicious cyber activity cost the U.S. economy \$57-109 billion (para. 3). In a secure computer system, both the components and the connections between them are secure. Securing entire computer systems is often infeasible, but administrators can protect systems by ensuring the security of their foundational software, even without directly securing other components. Compilers are programs that translate code into a format that can be executed by a computer, and underlie virtually all software. In the process of compilation, transformations are performed to

create the final program, but if these transformations are not sound, they may introduce logical errors, reliability issues, and security vulnerabilities (Ashraf et al., 2017; Hohnka et al., 2019).

The research aims to propose a tool to verify transformations made during compilation are sound in order to improve the security at the foundation of computer systems.

THE RISING DANGER OF NONMEDICAL VACCINE EXEMPTIONS

All states in the U.S. require children to be vaccinated against preventable diseases for school attendance (Centers for Disease Control [CDC], 2018). These immunization requirements have been highly effective in raising vaccination rates and reducing the incidence of preventable diseases (Omer, Salmon, Orenstein, deHart, & Halsey, 2009). However, all vaccination laws allow for exemptions, and clusters of high exemption rates have been found to significantly increase the chances of disease outbreaks (Omer, et al., 2009). Out of necessity, all states permit medical exemptions to vaccination laws (National Conference of State Legislatures [NCSL], 2020). Nonmedical exemptions, however, are permitted by many states in varying forms. As illustrated in Figure 1, currently forty-five states allow exemptions for religious objections to vaccination, and fifteen states allow for philosophical or “personal belief” exemptions (NCSL, 2020).

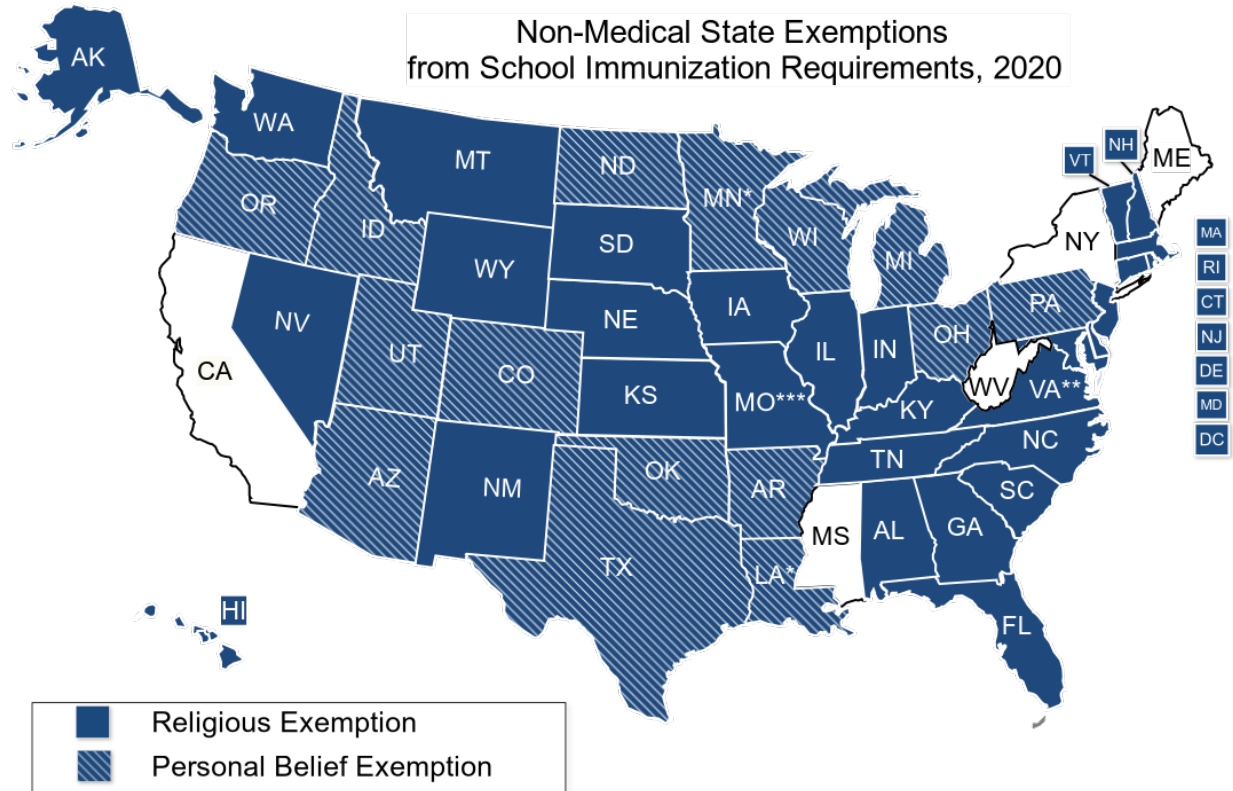


Figure 1. Non-medical state exemptions from school immunization requirements in 2020. The majority of states allow for religious vaccine exemptions, while a smaller, but still significant, number allow for personal belief exemptions (Adapted by Whitaker from the National Conference of State Legislatures, 2020).

Olive, Hotez, Damania, & Nolan (2018) found that since 2009, the number of philosophical exemptions have risen in the majority of states that permit them. In the same research, Olive, et al. (2018) found that states with higher rates of nonmedical exemptions do in fact have lower vaccine coverage, “rendering select cities vulnerable for vaccination-preventable diseases.” In order to combat these trends, there has been increased interest in reforming nonmedical exemption laws, but progression has proven challenging due to the ethical complexity of the issue and the wide range of stakeholders involved, as seen in the Actor-Network Theory diagram in Figure 1. This research aims to discuss the ethical concerns of the situation and assess the merits of proposed solutions in order to provide guidance on which solutions hold promise.

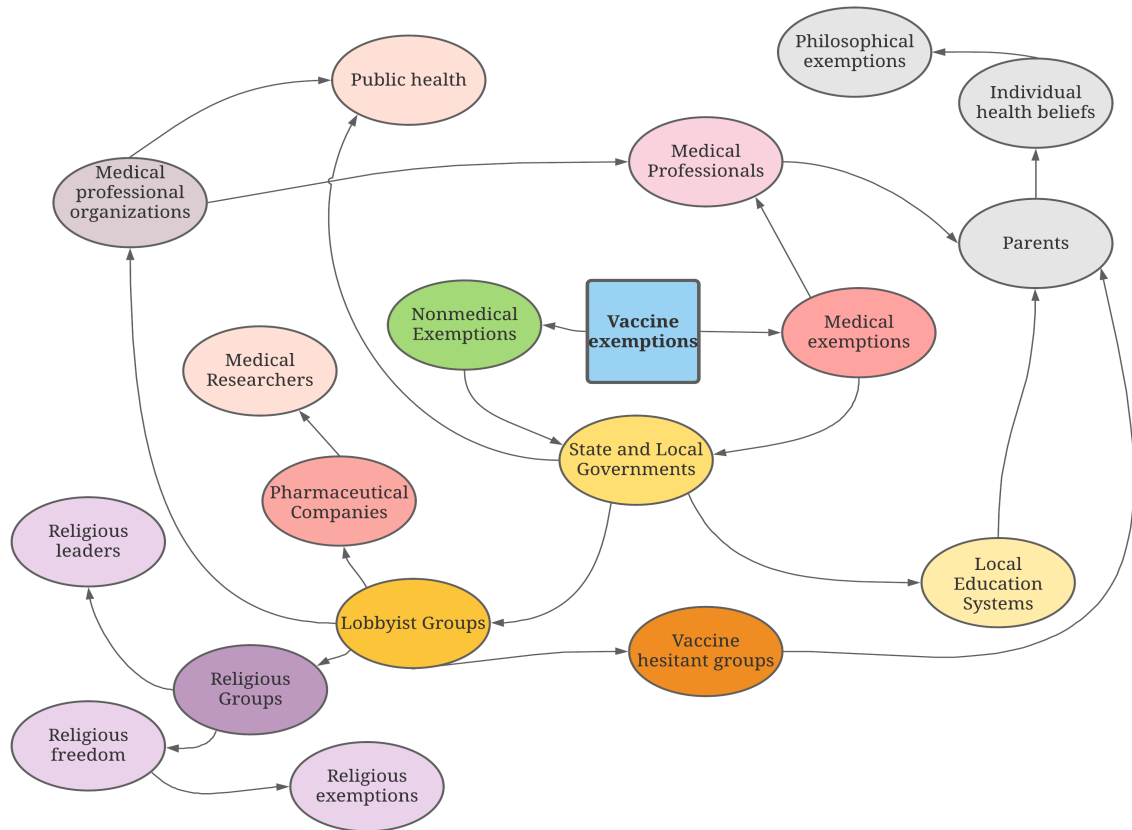


Figure 2. This diagram identifies the stakeholders in the issue of nonmedical vaccine exemptions by illustrating the actors in the framework of actor network theory (Created by Whitaker, 2021).

THE ETHICS OF NONMEDICAL VACCINE EXEMPTIONS

The ethical question at the core of nonmedical vaccine exemptions is whether or not they are a moral right. The answer to this question is crucial, as if one believes that a moral right to nonmedical exemptions exists, then the range of acceptable solutions narrows considerably. As with many ethical questions surrounding public health, there is an inherent tradeoff between the right of the individual and the right of others. Adopting Jones' (1994) theory of rights, there is an important distinction to be made between liberty rights and claim rights. Liberty rights make a given action permissible, and require no duty from those outside of the rights-holder. Claim-rights, by contrast, create a duty in others and are therefore more intrusive. Viewing the individual in isolation, the right to refuse unwanted medical treatment can be seen as a liberty

right. In reality, however, nonmedical vaccine exemptions are a claim right, as they create a duty in others to bear the safety risk of jeopardizing herd immunity. Due to the fact that such a duty would infringe on others' basic rights to health and safety, there is no moral right to nonmedical vaccine exemptions in most cases. However, as argued by Emhoff, Fugate, & Eyal (2016), receiving nonmedical vaccine exemptions only creates a duty in others if herd immunity is in jeopardy (p. 606). In cases where the number of individuals receiving exemptions is relatively small and herd immunity is strong enough that these exemptions would not have an effect, there is no duty imposed by receiving nonmedical exemptions. If one's goal is to minimize the intrusion of rights, care would need to be taken to constantly appraise the state of herd immunity and adjust restrictions on nonmedical exemptions accordingly. Practically speaking, this would increase the regulatory cost and burden the enforcement of any such restriction. However, due to the fact that in recent years herd immunity for a number of diseases has come into jeopardy, it can be argued that the U.S. is already at the point at which there is no moral right to a nonmedical vaccine exemption. It is important to note, however, that even if no such moral right exists, it does not necessarily mean that the removal of nonmedical exemptions is the most desirable solution.

THE STATE OF SOLUTIONS

ELIMINATION OF THE NONMEDICAL EXEMPTION

Eliminating nonmedical exemptions (NMEs) entirely is perhaps the most intuitive solution to the issue and has been pursued by multiple states in recent years, though it also faces heavy resistance. Medical associations have come out strongly in support of eliminating NMEs (American Medical Association [AMA], 2019; American Academy of Pediatrics [AAP], 2019). The AAP named the advancement of laws to eliminate NMEs its top priority for the year of

2019. On the opposite side, religious groups such as Agudath Israel of America (2019) oppose eliminating NMEs, claiming they impinge on religious freedoms. An additional voice of opposition is vaccine hesitant, grassroots organizations such as the National Vaccine Information Center (n.d.), who strongly believe that NMEs are a matter of personal freedom. This clash of beliefs has made the progression of legislation to eliminate NMEs difficult.

Despite being proposed in a large number of state legislatures, laws eliminating NMEs have only been successfully passed by two states in recent years: California and New York. The outcome of these laws has also been unclear. In the case of California, in particular, the elimination of NMEs did improve vaccination rates but not as much as hoped, due to medical exemptions increasing (Delamater et al., 2019). In general, medical professionals sympathetic to vaccine-hesitant parents have the potential to undermine the benefit of removing NMEs (Delamater et al., 2019). Efforts in California to investigate and punish medical professionals who authorize unnecessary medical exemptions have also been met with heavy resistance, impeding the government's ability to effectively enforce the law (Gardiner, 2019). In all, the outright elimination of NMEs faces major challenges both before and after enactment, making this solution less than ideal.

MAKE NONMEDICAL EXEMPTIONS INCONVENIENT

A more palatable solution proposed by public health and ethics researchers is to make nonmedical exemptions more challenging and inconvenient to receive. This would come in the form of enacting fines, fees, mandatory education, having long application processes, or imposing other inconveniences to discourage parents from pursuing NMEs. Theoretically, the benefit of this approach is that it appeases groups opposed to fully eliminating NMEs, making this solution easier to enact. This benefit, however, comes at the cost of allowing those who are

most strongly against vaccines to still receive them. The real-world effects of making NMEs more inconvenient has not been studied widely, but one assessment of Michigan's introduction of mandatory education for those applying for NMEs found this led to a roughly 30% reduction in nonmedical exemption rates (Navin, Largent, & McCright, 2020). This approach, however, has been supported by medical ethicists, such as Navin & Largent (2017), who argue this is the most ethically acceptable solution, and would still be reasonably effective. Collectively, this solution holds promise, but lacks real-world data to support its usage. However, the relatively low cost of implementation and compatibility with other solutions make this worth attempting, potentially in parallel with other approaches.

IMPROVE THE ENVIRONMENT, NOT THE LAW

Moving away from legislative remedies, some argue that changing laws around nonmedical exemptions fail to address the core problems that lead to vaccine hesitancy. The argument also maintains that those who are vaccine hesitant will not be swayed, or may circumvent law changes by resorting to homeschooling and other ways of avoiding immunization requirements altogether.

To approach the core of vaccine hesitancy, the general goal of this approach is to improve the level of trust in modern medicine, as well as providing education on the true benefits and risks of vaccination. Williams, Nussbaum, & O'Leary (2019) of the American Academy for Pediatrics explored this approach in a real-world trial. Their focus was on identifying religious leaders' views on vaccination, and setting up avenues for community discussion and dialogue. They found that religious leaders generally supported vaccination and were open to dialogue on improving their followers' education and trust in vaccinations.

This solution is by far the most difficult and unclear to enact, and is an incredibly active area of research and debate. Focusing on attacking the root cause of nonmedical exemptions widens the scope of the solution to solving vaccine hesitancy in general, which will most likely take years to see benefits. The ambition and long-term nature of this approach makes it unwise to pursue this as the sole solution to the rise of NMEs. This solution is not mutually exclusive with others, and most likely this will be a necessary accompaniment to more targeted and short-term solutions.

RECOMMENDATIONS FOR MOVING FORWARD

Due to the challenges of eliminating nonmedical vaccine exemptions, and the fact that the outcome may not be as positive as expected, it seems that the most reasonable approach is to make the nonmedical exemption application process more burdensome and restrictive, alongside increased education and efforts to build trust in communities. There has been a large amount of theoretical research on the topic of NMEs, but far less actual data to inform potential solutions. This calls for more real world experience and experimentation, at which point the landscape of solutions may become clearer.

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