

Original Investigation

Power and Persuasion in the Vaccine Debates:
An Analysis of Political Efforts and Outcomes
in the United States, 1998-2012

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Policy Points:

- From 2011 to 2013, immunization proponents won significant legislative victories that tightened philosophical exemptions in Washington, Oregon, and California.
- Highlighting data on the high rates of unvaccinated children and subsequent, preventable infectious disease outbreaks has proven to be quite compelling to state lawmakers, especially when combined with physician expert testimony. Even vigorous protest from vaccine-critical organizations failed to defeat recent legislative wins when other political conditions were favorable.
- Our research suggests that immunization proponents have not been as active as they could be, and that much of the energy in pressing for new policies over the past 15 years has been on the vaccine-critical side of the aisle.

Context: This article examines trends in state-level childhood vaccine policies in the United States from 1998 to 2012 and explains the trajectories for both vaccine-critical and proimmunization legislative efforts. Successful mobilization by vaccine critics during the height of the autism and thimerosal scares (roughly 1998 to 2003) yielded a few state-level expansions for the most permissive type of exemption from vaccine mandates for public school attendance, those based on personal beliefs. Vaccine-critical positions, however, have largely become discredited. How has vaccine critics' ability to advance preferred policies and prevent the passage of unfavorable legislation changed over time?

Methods: We created a unique data set of childhood vaccine bills ($n = 636$), introduced from 1998 to 2012 across the 50 state legislatures, and coded them

by type of effort (exemption, mandate, mercury ban, and information policies) and outcome. We then mapped out the trends in vaccine policies over time. In order to contextualize the trends we identified, we also reviewed numerous primary sources and conducted interviews with stakeholders.

Findings: In general, we found that vaccine critics' legislative success has begun to wane. In only 20 bills in our data set were vaccine critics able to change policy in their preferred direction via the legislative process. Only 5 of those wins were significant (such as obtaining a new philosophical exemption to vaccine mandates), and the last of these was in 2007. Critics were more successful at preventing passage of proimmunization legislation, such as mandates for the human papillomavirus (HPV) vaccine.

Conclusions: Recent legislation in California, Oregon, and Washington that tightened philosophical exemptions by means of informational requirements suggests that vaccine politics may be entering another phase, one in which immunization supporters may be able to counter increasing opt-out rates, particularly in states with recent outbreaks and politicians favoring science-based policies.

Keywords: child, health legislation, United States, vaccination.

DURING THE LAST 15 YEARS, THERE HAS BEEN GREAT controversy in the United States over childhood vaccine policy. This controversy was initially sparked by a paper—later retracted by *The Lancet*¹—and press conference comments by British gastroenterologist Andrew Wakefield in which he speculated that the measles component of the MMR (measles-mumps-rubella) vaccine was associated with autism. Also, in the United States, the revelation that a mercury-based preservative, thimerosal, was present in vaccines at levels that could exceed 1 of 3 different regulatory standards prompted its removal from the US vaccine supply.² In fact, vaccines have always been controversial,³ and much of our vaccine safety and injury compensation system owes its existence to concerns in the 1980s about adverse reactions to the diphtheria-pertussis-tetanus, or DTP, vaccine, and many of the activists who mobilized against the vaccine remain organized today.

Nonetheless, despite the linkages to past vaccine controversies, we argue that the fears regarding the MMR vaccine that emerged from the Wakefield paper and the thimerosal revelations in the late 1990s mark the start of a unique period in the history of US vaccine politics. This period is characterized by very low levels of vaccine-preventable diseases,

an increase in the number of vaccines recommended for children, high levels of organized interest-group activity opposing vaccine mandates, diffusion of doubt about vaccine safety among some parents, greater use of exemptions to avoid or delay childhood vaccinations, and large investments in research and promotion of scientific results demonstrating the safety of the US vaccine supply.

The 1998 Wakefield paper and the 1999 thimerosal revelation and removal helped vaccine critics portray vaccines as unsafe. But have recent events—such as the discrediting of the link between autism and vaccines and the publicity of outbreaks of whooping cough, Hib disease, and measles—reversed or slowed the gains made by vaccine critics at the state level? Indeed, political activists at organizations like the National Vaccine Information Center (NVIC) recently reported more challenging conditions for their efforts in state houses.⁴ We hypothesized that perhaps the conditions that enabled vaccine critics to enact favorable legislation have changed since the early days of the autism-vaccine and thimerosal scares of the late 1990s and early 2000s. Our first objective, therefore, was to systematically map out all state-level bills introduced by both vaccine critics and immunization supporters spanning the period of initial controversy, the human papillomavirus (HPV) mandate push in the mid-2000s, the 2010 Wakefield retraction, and the disease outbreaks currently worrying state officials. We examined what we term immunization *boundary policies*, which determine which vaccines children are mandated to receive, who can be exempted from these vaccines, and whether the use of some vaccines is restricted because of mercury content. Boundaries can be drawn around vaccines—which are included in a state's mandate and which are not, for example—or around people subject to the vaccine mandate. Boundary policies can vary according to how many vaccines are mandated or how easy it is to evade them by opting out of vaccination. We also examined what we term *information policies*, which seek to inform parents of vaccine ingredients present in their child's immunizations and thus may lead them to question the vaccines' safety, as well as those policies that aim to educate parents about vaccine-preventable diseases. Our second objective was to find patterns in the timing and content of legislative efforts surrounding childhood vaccinations.

There is a great deal of public health research on vaccines, lay risk assessments of their relative safety, and the effects of various immunization policies, such as state exemptions or new proposals to mandate the HPV

vaccine.⁵⁻⁹ One recently published study analyzed state vaccine politics from 2011 to 2013, noting that while more bills had been introduced to broaden vaccine exemptions, only those tightening the exemption policies actually passed.¹⁰ No study has yet charted the outcomes of state-level political controversies across this entire tumultuous period and shown systematically the trajectories of the multifaceted legislative efforts of vaccine critics and immunization proponents. This article examines US state-level legislative attempts to change vaccine policy from 1998 to 2012, categorizes the legislative efforts made, and explains the outcomes of these efforts. In order to better understand these outcomes, we also offer observations about the factors driving political fortunes in vaccine debates based on primary sources from a selection of these political struggles, and we close with predictions for the future of state-level vaccine politics.

State Policies Governing Policy Boundaries and Information Provision

Struggles Over the Boundaries of Vaccine Policies

State legislatures are a critical location for policy contestation over vaccines, as vaccine mandates are matters of state law (although federal approval by the US Food and Drug Administration [FDA] and recommendation by the Advisory Committee on Immunization Practices of the Centers for Disease Control and Prevention [CDC] must precede any state mandate). Legislatures can directly set vaccine policy, grant discretion to the state public health department to do so, or both. The first pivotal struggle over vaccine law and policy that we describe pertains to the *boundaries* of a state's childhood vaccine mandate, which requires a set of immunizations before admission to public schools (and, in some states, to day care). How can one evade these boundaries? Many states grant exemptions from mandated vaccines for medical, religious, or philosophical reasons. Some states also exempt children with demonstrated immunity to a disease, usually proved by a blood test or a disease history. Exemptions based on philosophical or personal beliefs permit parents to "opt out" of immunizations without claiming a religious reason or a medical contraindication. Most parents seeking an exemption because of vaccine safety concerns find the philosophical exemption to be

the best-fitting justification. Christian Scientists may claim a religious exemption to vaccination, but none of the major religious groups in the United States have a doctrinal ban on vaccination.

We found no consensus in previously published works and on interest groups' websites about precisely which states offer which kinds of exemptions. Some state statutes do not clearly define what kinds of beliefs are the basis for an exemption, and because each state's legal regime is shared among the legislature, health administrators, and courts, it may not be obvious from the statutes alone how the exemptions actually function in practice. For example, a state may not explicitly list a religious exemption, even though religious belief can be considered a subset of its "personal belief" exemption. California is a state with a statutory personal belief exemption but no explicit religious exemption. In 2012, however, because Governor Jerry Brown noted in a signing statement to a recent bill that administrators would honor religious exemptions, we count California as having a religious exemption in practice.

Adding to the complexity, a state can have a religious exemption but no philosophical exemption. Administrators or judges, however, can order that there be no interrogation of the basis of the religious exemptions, so they function as *de facto* philosophical exemptions. The questions in these disputes are whether a state must accommodate religion by permitting a religious exemption under the free exercise clause of the First Amendment, how stringently the state may define what qualifies as religious belief or membership, and whether the differential treatment of religious people, as opposed to anyone else seeking an exemption, is permissible. Lawsuits by parents have tested religious exemptions in many jurisdictions, generating different court opinions on whether the state can require a certain level of demonstrated sincerity of religious belief or membership in a recognized religious order. New York courts and federal courts applying New York law have permitted inquiry into sincerity and religious membership, holding that scientific doubts about vaccines,¹¹ chiropractic ethical objections,¹² and fears that vaccines cause autism¹³ do not count as valid reasons for invoking the religious exemption. Nonetheless, litigation in New York also established that membership in a religious organization is not required.¹⁴ In Arkansas, litigation struck down that state's requirement that petitioners for exemptions belong to a recognized religious group with a doctrinal opposition to vaccination,¹⁵ and the next year the legislature enacted a broader philosophical exemption. In New Jersey, administrative

directives prohibit examining the content of religious belief or membership, and in Florida¹⁶ and Wyoming,¹⁷ judicial opinions have forbidden any administrative inquiry into the details of the religious belief. We regard these states as having a de facto philosophical exemption.

We analyzed the specific wording of each state's statutes and reviewed state administrative practices and court decisions to summarize what exemptions are offered, as of 2012, both "on the books" and in practice. In a majority of states, the legal statutes and practice are clear and unambiguous. Mississippi and West Virginia clearly offer only medical exemptions. Furthermore, 25 states clearly offer only religious and medical exemptions (Alabama, Alaska, Connecticut, Delaware, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Montana, Nebraska, Nevada, New Hampshire, New Mexico, New York, North Carolina, Rhode Island, South Carolina, South Dakota, Tennessee, and Virginia). We consider the religious exemptions in these states clear because they explicitly refer to religious membership, practice, or tenets, rather than using language indicating the inclusion of secular beliefs such as "ethical values." In addition, these states have no court opinions directing administrators to accept, without scrutiny, a petitioner's claims about religious belief. Thirteen states specify the existence of both religious and philosophical exemptions (Arkansas, Colorado, Idaho, Maine, Michigan, North Dakota, Ohio, Oklahoma, Texas, Utah, Vermont, Washington, and Wisconsin).

In contrast, we found the exemption policies of 10 states to be unclear. The statutes of 6 states (Arizona, California, Louisiana, Minnesota, Oregon, and Pennsylvania) are ambiguously worded in such a way as to group together all nonmedical exemptions using broad language, thereby making it difficult to determine whether they offer both a religious and a philosophical exemption or just a philosophical one. These states typically refer to their nonmedical exemption as being based on a "personal belief," ethical convictions, values, or similarly inclusive language. We counted these states as having *both* religious and philosophical exemptions because both rationales are supported by the language and there are no court cases to the contrary. Although Governor Brown's explicit directive made California's religious exemption clear, we placed it with the unclear cases because many parents may not be aware of it. Florida remains somewhat ambiguous even after the court decision rendering its religious exemption a de facto philosophical exemption, because it was heard in the First District in Tallahassee but was not

reviewed and affirmed in Florida's supreme court. The Wyoming case, by contrast, was a state supreme court ruling that applied statewide, but we counted it as unclear because Wyoming citizens may not know that religious claims have no restriction on their meaning if they are unaware of the ruling. Likewise in New Jersey, administrative directives have created a de facto philosophical exemption (interview with Drew Harris, New Jersey Public Health Institute, July 2013), but a citizen looking up the statute would not know that. Finally, Missouri regulations allow philosophical exemptions for preschool and day care, but not for K-12 education. We consider Missouri to offer only a religious exemption, since our focus is on school requirements nationwide. In total, we found that as of 2012, 50 states had medical exemptions, 48 states had religious exemptions, and 22 states had philosophical exemptions.

Legislative struggles over boundaries appeared following public concerns about the safety of the MMR vaccine and thimerosal, as vaccine-critical groups worked hard to expand state-level exemptions to mandatory childhood vaccination policies or to remove mandates entirely. Changes in exemption policy are noteworthy because with broad exemption policies in place, parents can easily forgo mandated vaccines. At what we have identified as the high point of vaccine-critical organizing, 3 states added new philosophical exemptions (Arizona in 2002 by regulation, and thus not a part of our database, and Texas and Arkansas in 2003 through legislative efforts). When exemptions are easy to obtain, their usage increases and is higher than in states that have either no philosophical exemption or some informational or administrative requirements making exemptions somewhat more difficult to secure.¹⁸

Struggles Over the Provision of Vaccine Information

The second pivotal struggle during this recent period was over the *information* that must be presented about vaccines, vaccine-preventable disease, and their consequences. This information is often relayed in the conversation between a health care provider and the parents during an immunization visit, but perhaps also in more broadly distributed materials. Vaccine-critical activists have made much of the fact that vaccines contain formaldehyde or mercury, or may have been developed with

cell lines originally obtained from aborted human fetuses (eg, rubella, varicella, and hepatitis A).¹⁹ Introducing bills requiring that parents be informed about vaccine ingredients is part of a strategy to heighten perceptions that vaccines are dangerous. Highlighting vaccine ingredients also rhetorically links the vaccine-critical cause with health movements against environmental contaminants and with natural food movements. The complexity of vaccine ingredients may sit awkwardly with cultural norms against eating food products that contain processed ingredients with, for instance, long and complex-sounding names. As the popular food author Michael Pollan warned, “If you can’t pronounce it, don’t eat it.”²⁰ These vaccine-critical bills also may be presented as simply more information for the consumer, a popular value in health care communication. The ingredient bills then put immunization supporters in the difficult position of arguing against the presentation of information that will be hard for them to discuss fully in a brief office visit. Doctors, too, may object to the accuracy of the information presented by vaccine critics about ingredients because it actually may be incorrect or because information furnished by a physician may legitimate critics’ claims that certain ingredients are unsafe. Immunization advocates have also put forth informational bills, particularly where there is no state mandate for a particular vaccine, such as for HPV or influenza. These informational bills require that parents be told that the vaccine is available and be advised of the risks of the disease it prevents, which may encourage parents to voluntarily vaccinate their child.

Conceptual Framework

To analyze the trajectories of state childhood vaccine policy, we used Thomas Oliver’s conceptual framework for examining the politicization of health controversies.²¹ Oliver cites 3 factors as important to determining whether a health issue comes to be seen as properly political, that is, requiring a public solution negotiated through power relations among people. First, there must be a *risk assessment* that captures sufficient attention to mobilize the public and their representatives; second, there must be an appropriately targeted *locus of responsibility* that is widely regarded as the cause of the problem; and third, there must be an appealing *social construction of target populations* who need help from a policy change.²¹(pp197–203)

We argue that these 3 factors (risk assessment, locus of responsibility, and social construction of target populations) help explain the overall trends we present here. Vaccine critics enjoyed some traction with these factors in the early years of the autism-vaccine scare, securing favorable policy changes by arguing that vaccines were risky, that the government was responsible for lax oversight of profiteering pharmaceutical companies, and that vulnerable children and their well-informed parents deserved to make their own vaccine choices. But then the tide turned against the autism-vaccine hypothesis, and the political leverage of these arguments weakened as well. We show that immunization advocates recently contended, successfully, that resurgences of diseases like whooping cough are the real risks, that higher opt-out rates and lax exemption laws are to blame, and that vulnerable newborns need more protection in the form of stiffer exemption policies.

Methods

We created an original database of state legislative policy efforts regarding vaccine requirements from 1998 to 2012 ($n = 636$) and coded these efforts by intent (meaning simply their purpose or the action they were introduced to create, such as mandating a newly approved vaccine) and by outcome (enactment into law, or failure by being held in committee or voted down). We built the database by searching LexisNexis State Capital, the National Conference of State Legislatures, the Access World News database, Association of State and Territorial Health Officials, and advocacy group websites and newsletters, such as the NVIC and the American Academy of Pediatrics. We used the “bill tracking by keyword” function in LexisNexis State Capital using the search terms “vacc!” or “immuniz!” and not “cattle” or “dog” or “veterinar!” between the years 1998 and 2012. We also used the search terms “vaccine” or “vaccination”; “child” or “children”; “mandate,” “exemption,” or “opt-out”; and “bill,” “measure,” or “legislation” between January 1, 2009, and May 30, 2012, in Access World News. If the bill’s purpose was unclear from the title or description, we reviewed the full text when it was available. (The complete database is available from Denise Lillvis by request.) One of us reviewed and coded the bills, consulting the other 2 when the bill’s intent was unclear. In addition, a fourth researcher conducted a blinded replication of the database in which she repeated our

search process for 20% (150) of the 750 state-years included in our study and was able to independently reproduce more than 90% of the database.

No other study has so comprehensively examined child vaccine policy across a relatively long period of time and across all 50 states. Although this method of legislative database research is standard in the public health and political science literature, we also included a replication exercise that further validates the comprehensiveness of our sampling. Boushey and Pacheco²² constructed a database of state vaccine legislation from 1990 to 2010, and as we did, they collected data regarding bill introductions using a LexisNexis State Capital keyword search. Unlike our study, though, which targeted a specific population (children), Boushey and Pacheco focused on 11 vaccine policy areas, such as employment, school-related mandates, and animals. A study by Colgrove, Abiola, and Mello⁶ examined data on the legislation state, date of introduction, date of last action, and outcome of HPV mandates from 2006 to 2008. Other studies have been able to utilize state legislation datasets collected by government entities. For example, Shipan and Volden²³ looked at 3 types of smoking policies from 1975 to 2000: government building restrictions, restaurant restrictions, and out-of-package sales restrictions. For their analysis, they used data collected by the National Cancer Institute, including whether the law passed, when it passed, and its content.

Because we focused on childhood vaccine policy, we did not include bills on topics such as the influenza vaccine for health care workers or bills specifically about emergency preparedness. But in order to capture as broad a sense of the politics as possible, we included bills that were aimed at wider issues but that encompassed child vaccine policy, such as mercury bans and ingredient information bills. We counted each bill introduced in a state during the calendar year as 1 legislative effort, and if we identified the bill as part of a House/Senate bill pair, we counted the pair as 1 effort. Legislative efforts were defined as introduced bills that were grouped into the following 9 categories based on their legislative intent. If a bill had more than 1 legislative intent (eg, a mandate and a provision of disease risk information), we counted each intent within the bill as a distinct effort.

We classified each bill into 1 of the following 9 categories:

1. *Exemption expansion*: an effort to make it easier to opt out of vaccines by creating a new exemption or broadening an existing one.

This includes exemptions from vaccinations via demonstrations of immunity.

2. *Exemption contraction*: an effort to make it more difficult to opt out of vaccines by either withdrawing or adding more requirements to an existing exemption.
3. *Mandate expansion*: an addition of a recommended vaccine to a state's list of mandated childhood vaccines, or the expansion of the public health department's powers to monitor or add to a state's mandate policy (excluding influenza mandates).
4. *Mandate contraction*: a deletion of a mandated vaccine from a state's list of mandated childhood vaccines, or the restriction or burdening of the public health department's powers to monitor or add to a state's mandate policy.
5. *Mercury ban expansion*: a bill banning mercury or thimerosal from vaccines in that state or for use in a particular population subgroup, or a bill expanding a preexisting mercury ban to a broader population of people (such as children under age 8 instead of children under 3).
6. *Mercury ban contraction*: an amendment to an existing mercury ban allowing the use of mercury in some circumstances or populations or for a particular vaccine (such as influenza), often substantially undercutting or functionally overruling the original ban.
7. *Mercury information*: a bill requiring health care providers to tell parents about mercury in vaccines, with the expectation that this information will promote more refusals of vaccines or will frame vaccines as dangerous in the conversation with a health care provider.
8. *Ingredient information*: a bill requiring health care providers to give parents a list of vaccine ingredients with the expectation that this information will increase the refusals of vaccines or frame vaccines as dangerous in the conversation with a health care provider.
9. *Disease risk information* (in the absence of, or as a complement to, a mandate): a bill requiring health care providers to tell patients about the risks of a disease for which there is a vaccine available but that might not be mandated in that state (such as HPV), with the expectation that this information will promote use of

the vaccine by framing it as necessary to avoid contracting the disease.

The first 6 categories are *boundary* struggle categories, which contest what the state's childhood vaccine mandate will include, how stringent it will be, and whether the use of mercury-containing vaccines is restricted. The last 3 categories are *informational* struggle categories, which contest the public information, patient-provider interaction, and what is considered accurate information about vaccines' risks and benefits. We coded outcomes of the legislative efforts *from the vaccine critics' perspective*, according to the following definitions:

1. *Offensive win*: Enactment of a law sponsored or supported by vaccine critics (ie, exemption expansion, mandate removal, mercury ban initiation or ban expansion, mercury information, or ingredient information).
2. *Offensive loss*: Failure of a bill sponsored or supported by vaccine critics.
3. *Defensive win*: Failure of a bill opposed by vaccine critics (ie, an exemption contraction, mandate enactment, mercury ban contraction, or disease risk information).
4. *Defensive loss*: Enactment of a law opposed by vaccine critics.

Of course, not every bill in our database would be recognizable to a partisan in the vaccine debates as a genuine controversy. Some bills were introduced with only 1 sponsor and quietly died in committee. Others, particularly the efforts by the proimmunization side to add a newly approved vaccine, are routine efforts that were certainly not devised as a political proimmunization strategy. Many bills seem controversial only from a vaccine-critical political perspective, and while these are actively monitored nationwide by the NVIC's Advocacy Portal (its grassroots mobilization website for political organizing), the bills are unknown outside these networks. We attempted to balance our comprehensive approach of including every bill, regardless of its prominence, with highlights of important wins and losses and pivotal points of shifting political opportunity.

To better understand the trajectory of vaccine-critical legislative efforts, we studied the policymakers' own reasons as well as the arguments

made directly to them by lobbyists and constituents. We conducted 16 phone interviews with legislators (11) or their staffers (5) across several states (California, Kansas, Maine, New Hampshire, Vermont, and Washington). Because many legislators did not respond to our interview requests or could not remember details about past debates, we conducted the interviews based on availability and whether there was legislative activity in the recent past (2009-2012). We also interviewed 3 members of the public health community (ie, those in or close to state immunization program bureaucracies in New Jersey and Vermont, as well as a representative from a national immunization organization). In addition, we surveyed 266 state and local newspaper articles across 30 states, as well as bill analyses, testimonies, a signing statement, and other relevant documents across 12 states to capture policymakers' "primary voices." When it was available, we examined primary-source evidence from advocates, lobbyists, and individuals in the form of written and oral testimony given directly to legislators. We used this information to verify the purpose and outcomes of the bills, presented in this article in the Results section, and we used the themes in the primary data to contextualize our findings, in the Discussion section.

Our study has some limitations. First, our review of news sources (used to obtain quotations from legislators and to find any bills we may have missed) centered on the 2009 to 2012 time period, so our results here may have undercounted omnibus bills containing changes in vaccine policy that may have been mentioned in the news but that we did not find when searching for bills. But because we consulted numerous sources, we believe that any such omissions are few. Second, our causal claims about a bill's success or failure are tentative and supported by qualitative data that were very difficult to obtain, came from different types of sources, and were spread unevenly across states. We tried to interview many more legislators and ask them directly what they thought led to the fates of the bills they worked on, but most did not respond to our requests and some could not remember many details at all. Some had been persuaded by vaccine-critical groups to refuse to talk to us because of their mistrust of our research perspective, which made it difficult to interview a variety of stakeholders. Given these difficulties, we did not highlight our interview data in the Results section; rather, we used the data to clarify and contextualize trends in the bills' introduction, passage, or failure.

Results

Our study of recent state-level legislative efforts surrounding childhood vaccine policies revealed a range of politicization and legislative activity and captured noteworthy themes and trends. See Figures 1 and 2 for a representation of the trends in introduced bills in all US states by category from 1998 to 2012. Figure 1 illustrates the bills' boundary struggle categories, with the trends in attempts to alter which vaccines are mandated and to make exemptions easier or harder to obtain. Figure 2 shows the trends in the informational struggle categories, with the attempts to promote vaccines and the efforts to portray them as toxic and dangerous.

Because our results are from the vaccine-critical perspective, the efforts advancing their cause appear on the positive side of the axis showing the number of legislative efforts. Both legislative efforts to expand the availability of exemptions and efforts to contract the number of mandated vaccinations were made throughout the period (with the exception of 2006). The first legislation to ban mercury in vaccinations appeared in 2001, and the first legislation to inform parents about the dangers of mercury as an ingredient in vaccines appeared in 2003. Bills regarding information about ingredients appeared sporadically, starting in 2002.

Legislative efforts advancing the proimmunization perspective appear on the negative side of the horizontal axis. Most of these pertained to expanding the number of mandated vaccines and were followed soon after by bills requiring disease risk information to be provided to parents. Unlike the ingredient information bills, these bills framed vaccination in a positive light and highlighted the dangers of communicable diseases. Such efforts peaked in 2007, coinciding with a major legislative push to inform the public of HPV and to mandate a HPV vaccine for school-age children. Legislative efforts to lessen mercury bans also began to appear in 2007. Finally, intermittently throughout the study period, we found efforts to limit parents' ability to obtain vaccine exemptions; these efforts peaked in 2012.

Figure 3 displays the numbers of bills by state from 1998 to 2012, according to outcome category from the vaccine-critical perspective (ie, offensive win, defensive win, offensive loss, defensive loss). Table 1 lists the 20 "offensive wins" that were the clearest victories for vaccine critics during the study period, and Table 2 breaks down the outcomes by the different types of boundary and informational efforts.

Figure 1. Boundary Struggles: Trends in State Child Vaccination Bills Introduced, 1998-2012

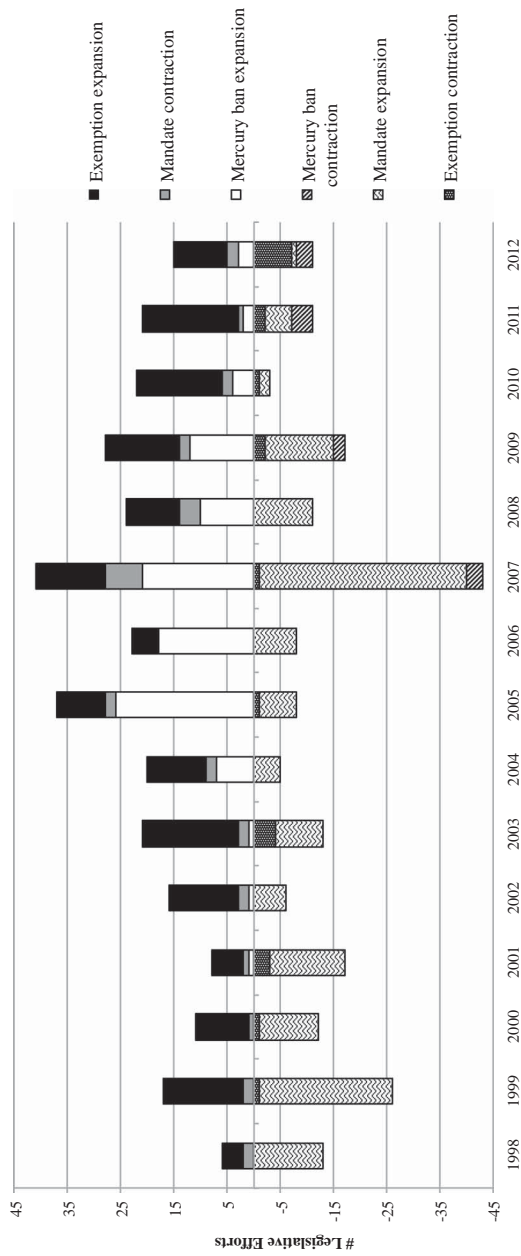


Figure 2. Informational Struggles: Trends in State Child Vaccination Bills Introduced, 1998-2012

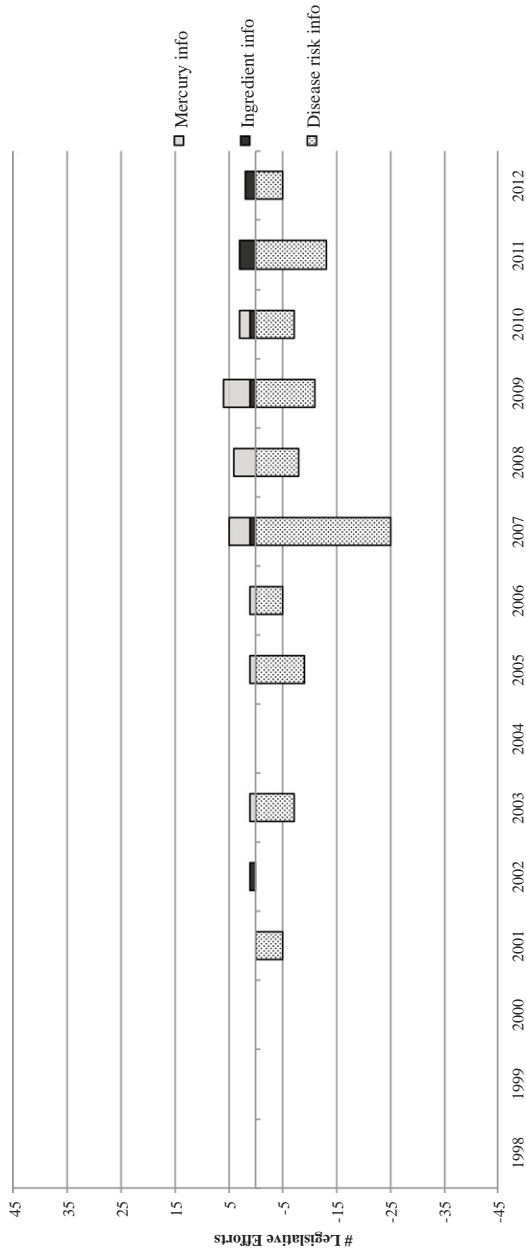
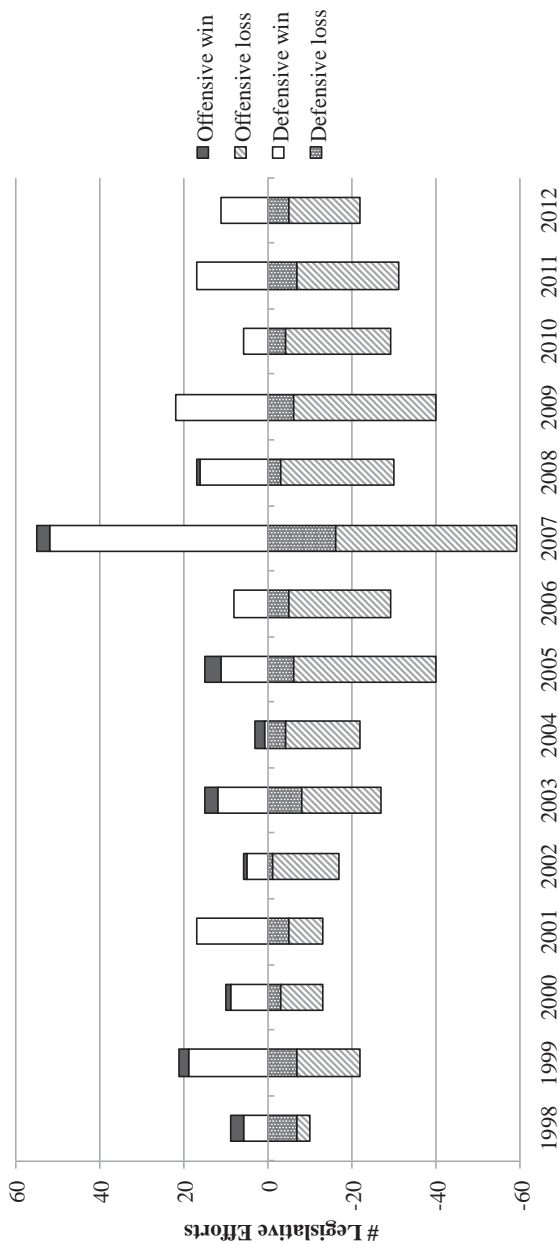


Figure 3. Vaccine-Critical Scorecard: Legislative Efforts, 1998-2012



On the positive side of the x-axis, offensive win refers to the number of favorable bills passed, while defensive win refers to the number of unfavorable bills defeated from the vaccine-critical perspective. On the negative side, offensive loss refers to the number of favorable bills defeated, while defensive loss refers to the number of unfavorable bills passed from the vaccine-critical perspective.

Table 1. Offensive Wins From the Vaccine-Critical Perspective, 1998-2012

State	Year	Bill(s)	Type	Summary
FL	1998	SB 1716	EE	Requires inclusion of procedure for exemption for any Department of Health vaccination rule.
KY	1998	HB 131	MC	Removes tuberculosis-testing requirement.
OK	1998	SB 1239	MC	Removes smallpox vaccination mandate.
ND	1999	SB 2126	EE	Broadens the belief types an individual can have to refuse vaccination.
VA	1999	HB 2295	EE	Provides that children who have evidence of immunity or a reliable medical history of disease are exempt from the varicella-zoster vaccine requirement.
NH	2000	HB 118	EE	Authorizes physicians from outside the state to complete certifications exempting children residing within the state from immunization.
NJ	2002	AB 2889	EE	Before administering a subsequent dose of a vaccine, the child's parent/guardian shall be given the option of a blood test to determine whether or not the child has already developed immunity.
AR	2003	SB 434	EE	Creates a philosophical exemption.
NY	2003	SB 2594 AB 5788	EE	Provides for waiver of required immunizations against chickenpox for admission to school if proof of immunity is presented.
TX	2003	HB 2292	EE	Creates a philosophical exemption.
CA	2004	AB 2943	MBE	Prohibits pregnant women and children under 3 from receiving a mercury-containing vaccine.

Continued

Table 1. *Continued*

State	Year	Bill(s)	Type	Summary
IA	2004	SB 2209	MBE	Prohibits children under 8 from receiving a mercury-containing vaccine.
DE	2005	HB 108	MBE	Requires that all immunizations be free of mercury.
IL	2005	HB 511 AB 1875	MBE	Creates the Mercury-Free Vaccine Act.
MO	2005	SB 74	MBE	Bans immunizations for knowingly pregnant women or children less than 3 years of age that contain more than 1 microgram of mercury per 5/10mL dose.
NY	2005	SB 2707C AB 5543C	MBE	Prohibits the administration of any vaccine or immunization that contains mercury.
IL	2007	SB 133	MBE	Directs public health officials to preferentially distribute flu vaccines that are thimerosal free or contain only trace amounts to children under age 3.
TX	2007	HB 1098 SB 438 HB 1115	MC	Provides that immunization against HPV is not required for a person's admission to school.
VA	2007	HB 2035 SB 1230	MC	Permits a parent to decline the HPV vaccine for a child for any reason after reviewing materials describing the link between HPV and cervical cancer.
DE	2008	HB 322	MBE	Prohibits pregnant women and children under 8 from receiving a mercury-containing vaccine, except under special circumstances.

EE = exemption expansion; MC = mandate contraction; MBE = mercury ban expansion.

Table 2. Results: A Comparison of Legislative Attempts and Victories

Bill Attempts (N) ^a	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Legislative Victories (%) ^b	0	1	1	3	0	4	0	1	0	1	0	2	1	2	7	23
Exemption Contraction	—	100%	0%	67%	—	100%	—	100%	—	100%	—	100%	100%	50%	86%	83%
% Defensive win	4	15	10	6	13	18	11	9	5	13	10	14	16	18	10	172
Exemption Expansion	25%	13%	10%	0%	8%	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%
% Offensive win	2	2	1	1	2	2	2	2	0	7	4	2	2	1	2	32
Mandate Contraction	100%	0%	0%	0%	0%	0%	0%	0%	—	29%	0%	0%	0%	0%	0%	13%
% Defensive win	13	25	11	14	6	9	5	7	8	39	11	13	2	5	1	169
Mandate Expansion	46%	72%	82%	86%	83%	56%	20%	71%	63%	87%	82%	77%	100%	100%	100%	75%
% Defensive win	0	0	0	0	0	0	0	0	0	3	0	2	0	4	3	12
Mercury Ban Contraction	—	—	—	—	—	—	—	—	—	33%	—	50%	—	75%	100%	67%
% Defensive win	0	0	0	1	1	1	7	26	18	21	10	12	4	2	3	106
Mercury Ban Expansion	—	—	—	0%	0%	0%	29%	15%	0%	5%	10%	0%	0%	0%	0%	8%
% Offensive win	0	0	0	5	0	7	0	9	5	25	8	11	7	13	5	95
Disease Risk Information	—	—	—	60%	—	43%	—	56%	60%	64%	88%	82%	43%	62%	20%	61%
% Defensive win	0	0	0	0	1	0	0	0	0	1	0	1	1	3	2	9
Ingredient Information	—	—	—	—	0%	—	—	—	—	0%	—	0%	0%	0%	0%	0%
% Offensive win	0	0	0	0	0	1	0	1	1	4	4	5	2	0	0	18
Mercury Information	—	—	—	—	—	0%	—	0%	0%	0%	0%	0%	0%	—	—	0%
% Offensive win	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

^aNumber of legislative attempts (bills proposed) in a particular category.^bPercentage of favorable bills passed (% offensive wins) or unfavorable bills defeated (% defensive wins), from the vaccine-critical perspective.

The central question driving our study was whether there has been a noticeable decline in political opportunities for vaccine critics. We argue that there certainly has. Vaccine critics hoped to achieve offensive wins in exemption expansions, mandate removals, mercury ban enactments and expansions, and mercury ingredient and vaccine ingredient bills. Despite the vaccine-critical movement's success at placing favorable policies on the legislative agenda and blocking some bills they oppose, critics have not succeeded in transforming childhood vaccine policy in their preferred direction over time. As Table 2 shows, vaccine critics and their legislative allies have not achieved any offensive wins in the form of exemption expansions since 2003. We counted only 20 offensive wins across the nation during the study period. Table 1 presents the specific state, bill, and a brief description of these laws. The last of the 4 mandate contraction wins occurred in 2007 (out of 32 nationwide attempts to roll back mandates during the study period). The critics' most recent offensive wins, in the form of mercury ban expansions (8 of which were passed nationwide during our study period), were in 2008; mercury bans or ban expansions failed to pass another 98 times, however (Tables 1 and 2). Of the 20 offensive wins for vaccine critics, some are quite unimportant (such as Oklahoma's 1998 removal of the smallpox vaccine mandate when routine smallpox vaccination already had ended in the United States in 1972), largely redundant (the 8 bills regarding mercury-free vaccines, when mercury already had been ordered removed from nearly all vaccines several years before), or useful only for the most determined parent trying to avoid vaccination (several bills allowing waivers for children who can prove prior immunity to the disease through exposure or a blood test).

But what kinds of successes have vaccine critics nonetheless been able to sustain? Vaccine-critical boundary victories were limited to "defensive wins," or legislative efforts in which vaccine critics were able to fend off bids to make it more difficult to avoid childhood vaccines, such as those in Arizona and Vermont in 2012. Notably, between 2002 and 2010, a time when exemption rates were rising in many communities across the United States, *no states* were able to contract exemptions in any way, although immunization supporters introduced 9 bills to do so. Furthermore, during our study period the vaccine-critical movement was able to thwart 19 attempts at constraining exemptions and 127 attempts at adding vaccines to the mandated requirements (although

37 of the latter defensive wins involved HPV, which has been a controversial mandate for many reasons, and it is likely that a rejected mandate for vaccines other than HPV will be mandated in a later year by the legislature or the health department). Even though the initial attempts were unsuccessful, bills mandating specific childhood vaccinations eventually passed in California, Iowa, Indiana, New Jersey, Ohio, and Virginia. In Washington, the legislation failed and was never reintroduced; instead, the mandate was instituted by the health department (a 2005 varicella mandate). Political science research on the dynamics of political mobilization in democratic legislatures predicts that this kind of defensive success will be easier to obtain than a full-scale policy shift in another direction, which often is difficult without a large, bipartisan coalition.²⁴

While these defensive wins are definitive successes from the vaccine-critical perspective, over the last couple of years, the movement began to lose ground in staving off exemption contractions. During the time period of this study, both Washington and California made it more difficult for parents to receive an exemption by adding a conversation with a health care provider as a precondition for obtaining the exemption. In 2013, Oregon followed suit. As we discuss in more detail later, these defeats occurred even though vaccine critics were highly mobilized to fight them. These recent moves to restrict parents' abilities to obtain exemptions after years of maintaining the status quo suggest that the political landscape may be getting tougher for vaccine critics, especially in states with high exemption rates and lax policies. Restricting access to philosophical exemptions may prove to be just as effective as eliminating the exemption altogether.

Vaccine critics also have attempted to influence public perceptions of vaccines by mandating that doctors show parents a list of vaccine ingredients or inform them when a vaccine contains mercury. During our study period, none of the ingredient awareness bills became law. It remains to be seen whether vaccine-critical groups will continue to use this strategy to persuade parents to reconsider vaccine risks. Even though critics have not succeeded in transforming official vaccine communication through the information bills, they have blocked numerous attempts at providing disease risk information that is meant to persuade parents to have their child vaccinated (58 defensive wins and 37 defensive losses in this information category).

Despite a highly salient debate over vaccines conducted since the late 1990s, we found that vaccine politics varies widely in the degree of controversy and change from state to state. Five states had almost no legislative efforts related to the vaccine policies of interest during the study period, meaning either there was no legislative activity in any of our 9 categories from 1998 to 2012 or perhaps only one bill that died in committee in one year. For example, Alaska's only recorded legislative effort during the study period, a failed exemption expansion, came in 2000. At the opposite end of the spectrum, New York State recorded 66 controversies resulting in 11 changes to the legislative status quo. The 2 most restrictive states, West Virginia and Mississippi, offer only medical exemptions to childhood vaccination mandates and have sustained many unsuccessful challenges to maintaining that policy over the last 15 years, 32 and 39 efforts, respectively. None led to policy change in West Virginia. Mississippi enacted 3 vaccine policy changes—a mandate expansion and 2 laws to provide disease risk information—but did not expand the exemptions. Table 3 shows the state variation in policy change from the perspective of the vaccine-critical movement. Here, an offensive win indicates that a proposed bill favorable to vaccine critics passed in this state during the study period, and a defensive loss means that a proposed bill unfavorable to vaccine critics passed.

Discussion

Our descriptive data cannot supply a causal account for what is driving legislative change, but we can begin to fill in the story of why these policy changes occurred by offering details from a broader look at primary sources and interview data. Given the important role that exemption policies play, we highlight 2 distinct inflection points in our data, corresponding to the years 2003 and 2011. We argue that 2003 is meaningful because it was the last time that vaccine critics won their most significant policy victory—new routes to opting out, with the philosophical exemptions in Texas and Arkansas—and that 2011 is important because it is the year in which vaccine critics began to sustain significant defensive losses in the form of narrowed philosophical exemptions. These 2 points are characterized by shifts in Oliver's framework in regard to risk assessment, locus of responsibility, and construction of target populations. We

Table 3. Wins and Losses by State That Resulted in Policy Change

	Change Favorable	Change Unfavorable
Proposed favorable	Offensive win (15 states) AR, CA, DE, FL, IA, IL, KY, MO, ND, NH, NJ, NY, OK, TX, VA	Offensive loss TN ^a
Proposed unfavorable	Defensive win VT ^b	Defensive loss (34 states) CA, CO, DE, GA, HI, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, ND, NE, NJ, NM, NY, OH, OK, OR, RI, SC, SD, TN, TX, VA, WA

^aTennessee is recorded as an offensive loss because a bill initially proposed in 2011 excluded home-schooled children from a vaccine mandate, but the resulting bill passed with an amendment striking this part of the bill.

^bVermont is recorded as a defensive win because legislation proposed in 2012 would have removed the philosophical exemption to vaccination; however, the law as passed resulted in the exemption being retained.

have simplified the politics, posited 2 sides to the debate (which we have termed *vaccine critics* and *immunization supporters*), and described the fluctuating political fortunes of the 2 sides using this framework. If critics are able to convince legislators that vaccines pose a safety risk, at least to some children; that overly aggressive public health policies, profiteering pharmaceutical companies, and a vaccine-happy federal government are responsible for creating this risk; and that well-informed parents and vulnerable children need legislative protection from coercion, they are likely to succeed, as was demonstrated between 1998 and 2003. But if immunization supporters can turn the conversation to the risks of unvaccinated children spreading disease in communities with permissive exemption policies; to parents' misinformation as the locus of responsibility; and to children vulnerable to diseases, such as those too young or too ill to be vaccinated, as those needing protection, then vaccine critics will have greater difficulty achieving success—a trend that began in 2011. Next we describe several of the most important recent events

in vaccine politics and how these rhetorical controversies played a role in the legislative outcomes.

Exemption Expansions at a High Point of Vaccine Criticism, 1998-2003

As we noted earlier, the last year in which there were any significant offensive wins for vaccine critics was 2003, in which both Texas and Arkansas enacted new philosophical exemptions. It is likely that 2003 was a high watermark of vaccine suspicion because parents had been mobilized for several years, but much of the research that discredited the link between vaccines and autism had not yet been published, and the public embarrassments of Dr. Andrew Wakefield were still several years away.²⁵ In contrast to the vaccine critics, the proimmunization groups were slower to organize and respond to the autism-vaccine controversy. The account by Texas activist Dawn Richardson of the fight for the 2003 exemption showcases a politically savvy side of vaccine-critical politics, in which instilling credibility, trust, and moderation; cultivating relationships over time in the legislature; avoiding partisan divides; and creating an appealing personal image paid off after 7 years of efforts.²⁶ Richardson advised advocates to emphasize the risks of vaccines by pulling out the manufacturer's own package insert and reading off the list of possible adverse effects, which are required to appear in the insert, regardless of whether a causal relationship has been established. In the legislative hearing records we obtained, vaccine critics consistently shared personal stories of vaccine damage, emphasizing the risks in highly emotional terms. They blamed the pharmaceutical companies and the government for insufficient attention to safety and presented themselves as a sympathetic target group in need of legislation to protect their parental rights. Together, these themes were persuasive in a conservative legislature in 2003. In our interviews touching on more recent struggles, however, legislators told us that while parents are still very mobilized, the debunking of Wakefield's research is now widely known, and thus the perceptions of vaccine-adverse events are not the political advantage they once were. While vaccine critics have tried to distance themselves from Dr. Wakefield and frame their concerns more broadly, we found that Wakefield's name operated as a heuristic to indicate credibility problems with vaccine criticism generally.

*The American Controversy: The Mercury Bills,
2001-2012*

Mercury revelations certainly galvanized US-based vaccine critics at the turn of the century. Activists capitalized on some unfavorable publicity about thimerosal in vaccines and amplified uncertainty about its possible effects. Thimerosal, which is about half ethyl mercury by weight, had been added to vaccines since the 1930s to prevent harmful bacteria from growing in multiuse vials.²⁷ The hepatitis B vaccine, the DTaP (diphtheria, tetanus, and acellular pertussis) vaccine, and the Hib (*Haemophilus influenzae* type b) vaccine all contained thimerosal, which could have delivered up to 187.5 μg (micrograms) of ethyl mercury to an infant in the first 6 months of life (ie, if she or he received an assortment of vaccines with the highest possible levels, although many combinations would have delivered less ethyl mercury). According to the FDA,²⁸ thimerosal remains in some multidose vials of flu vaccine (25 μg and 12.5 μg for a version administered to children under 3). The MMR vaccine has never contained thimerosal. After complying with a 1997 law requiring the FDA to survey mercury additives in products, federal regulators realized in 1999 that a child could potentially be exposed to more ethyl mercury (as thimerosal) through the recommended vaccine schedule than the Environmental Protection Agency (EPA) limit for methyl mercury, which is a different type of mercury that is a known environmental contaminant in fish. Methyl mercury was well studied at the time, but ethyl mercury was not, and it did not have its own safety standard. Accordingly, as a precaution, the American Academy of Pediatrics (AAP) and the US Public Health Service (USPHS) quickly recommended the removal of thimerosal from vaccines.²

A 2001 report on thimerosal-containing vaccines (TCVs) held that it was “biologically plausible” that thimerosal could be related to autism and that the evidence was inadequate to accept or reject a causal relationship owing to insufficient research.²⁹ Activist parents quickly organized around the amount of mercury in the 1990s childhood vaccine schedule and published a paper arguing that autism could be a new form of mercury poisoning.³⁰ By 2002, there were 68 lawsuits pending in 16 states alleging damage from mercury in vaccines or requesting health monitoring after receipt of a mercury-containing vaccine, 11 of which were putative (uncertified) class actions potentially covering more than 175 million people.³¹ (These lawsuits did not progress because they had

to move into the vaccine injury compensation court and could not be brought as regular civil actions.)

Although the paper by Bernard and colleagues, alleging that autism is similar to mercury poisoning, was soon debunked,³² those parents had mobilized to form SafeMinds, a prominent vaccine-critical activist group. By 2004, enough new studies had been published that an Institute of Medicine (IOM) review committee rejected hypotheses connecting either the MMR vaccine or thimerosal in vaccines to autism.³³ A few years later, special masters at the federal vaccine injury compensation court ruled that the MMR vaccine and thimerosal in vaccines had not been shown to have caused autism as a vaccine injury.³⁴

Overall, mercury politics in the United States has moved from the initial uncertainty and activist mobilization at the turn of the 21st century to mainstream scientific acceptance by the CDC, the IOM, the AAP, the World Health Organization, and the United Nations Environment Programme (UNEP) that thimerosal in vaccines is not harmful. Furthermore, its usefulness in keeping vaccines free of harmful pathogens endures, in both the manufacturing process and global vaccine programs in which the use of single vials is not always practicable. The vaccine-critical, antimercury movement persists, however, though some of its focus has shifted from vaccines to mercury pollution more generally.²⁵

Our study of the arc of mercury bills in the states confirms the overall story of initial scandal and mobilization followed by mainstream acceptance that these fears were unfounded. As we noted, 8 mercury bans were enacted, but 98 were not. The mercury bills that vaccine critics were able to pass would have had little impact beyond some multidose vials of the flu vaccine, since thimerosal already had been removed from other vaccines. Many states subsequently modified their mercury bans so broadly (such as passing a bill saying that a medical provider could use any vaccine approved by the FDA) that they were completely eviscerated. Activists have been unsuccessful both nationally and internationally in advancing their antithimerosal goals. The Mercury-Free Vaccines Act has been introduced 4 times in Congress (2004, 2005, 2007, and 2009) in the last decade by both Republicans and Democrats, but none of these bills ever made it out of committee.³⁵ In January 2013, the UN finalized language on the Minamata Convention on Mercury, which exempts mercury use in vaccines from its global efforts to reduce exposure to mercury.³⁶ Our data show that in recent years, general vaccine ingredient

bills have replaced mercury bills as the bill of choice to introduce, though without success. Although ideas about alarming vaccine ingredients do have traction in the media and as a focus of parental concerns, these bills have not proved to be promising policy avenues for vaccine critics.

The West Coast Exemption Contractions of 2011-2013

Health policy scholars have observed that tightening philosophical exemption requirements by adding informational steps before opting out (usually obtaining a physician's signature stating that he or she discussed vaccine risks and benefits with the family) would likely slow the increasing rates of exemptions.³⁷⁻³⁹ Proimmunization state legislators clearly heeded the suggestion, and between 2011 and 2013, the 3 West Coast states of California, Oregon, and Washington increased the stringency of their philosophical exemptions by requiring parents to obtain information from a health care provider about the benefits and risks of vaccination in order for their child to qualify for an exemption. Our primary-source research into the background of the policy changes in California and Washington revealed 6 reasons for the bills' final success: (1) the high salience of recent pertussis outbreaks in the states; (2) a sense among immunization supporters that their state was being shamefully singled out for having a nationally high opt-out rate; (3) a persistent, scientifically credible, and well-led coalition in support of the bills; (4) a reduction in the opposition's credibility, specifically around the debunking of the autism-vaccine hypothesis and the retraction of Dr. Wakefield's work, which made it difficult for them to draw in new supporters in the legislature; (5) the separation of the Christian Scientist community and its concerns from the concerns of parents opposed to vaccines for nonreligious reasons; and (6) the successful framing of the bills as increasing information rather than persecuting parents or restricting choices.

Washington had the country's highest rate of unvaccinated schoolchildren in 2011, according to a CDC report,⁴⁰ and then when Washington's exemption rate dropped after its new law went into effect, the unflattering spotlight came to rest on Oregon, with the nation's highest rate of unvaccinated kindergarteners in 2012.⁴¹ The CDC report was the first time that it ranked the states based on their vaccination rates. As Oliver's

analysis predicts, risk assessment can become highly salient when there are hard numbers to point to, and the enumeration and publication of which states had the highest opt-out rates clearly were very important to creating the necessary sense of urgency for policy change in the Pacific Northwest.

These bills passed despite vigorous opposition from the NVIC and other allied groups. The core coalition of vaccine opposition is composed primarily of libertarian health freedom activists, alternative medicine practitioners and adherents, chiropractors and homeopaths, and mobilized parents who believe that vaccines are unsafe (and who often lean libertarian or reject mainstream medicine themselves).²⁵ The NVIC issued action alerts to its members encouraging them to contact legislators in opposition, and they were successful at disseminating their message. In addition, a lobbyist represented the NVIC at the Washington state capitol to speak against the measure. Other groups also testified against the bill in Washington: the Christian Homeschool Network, Talk About Curing Autism, and the locally organized Mercury Awareness Team, as well as some individual parents and children. The media noted the level of activism from citizen opponents in Washington, describing them as packing hearings, lobbying lawmakers, and turning out 100 people or more at committee hearings.⁴² Washington and California legislators and their staff who guided these bills through to passage noted that while there still were vocal vaccine-critical celebrities such as comedian Rob Schneider and mobilized families staunchly opposed, they were not able to bring in new allies and had lost the support of some legislators who changed their minds in light of the debunking of the autism-vaccine hypothesis or were not reelected. Although this energetic mobilization is likely to continue in many states, as a new state rises to the top of the CDC's list of the highest exemption rates, we would expect to see more bills proposing additional restrictions on exemption policies.

Conclusion

The vaccine-critical movement has been able to establish a network of advocates poised to seek out and support new legislative opportunities while defending their cause against unfavorable legislation. Vaccine critics are mobilized, well funded, and not going away.²⁵ As the lead NVIC political organizer noted in her recent newsletter to activists,

mobilizing for legislative battles, even when they are lost, is important to recruiting and training new volunteers for the organization.⁴ Even strategies that were not very successful, such as the vaccine ingredient bills, help keep the vaccine-critical agenda in front of the legislature and mobilize supporters. Critics will no doubt remain vigilant for the next crisis in vaccine trust that will shift Oliver's concepts of risk, responsibility, and target population back to more favorable terms. In the meantime, vaccine supporters face the challenge that when vaccines work well, it is easy not to notice the good they do and thus harder to muster passionate political support.

Immunization proponents have clearly found a new way to win with the West Coast strategy of tightening (but not attempting to remove) lax exemption policies. Those state policy changes were supported by federal research and publicity—particularly the CDC's ranking of states with the largest numbers of exempted children—and immunization proponents certainly could continue to maximize the significant informational advantages that come from, for example, sharing immunization goals with federal agencies and research hospitals. One of the proimmunization force's greatest advantages is the expertise and credibility of every mainstream medical and governmental organization.

Even with this advantage, there are other ways that immunization proponents can make the most of recent political opportunities. Our interviews and primary-source documents make clear that vaccine critics have been quite successful at directing attention to children allegedly hurt by vaccines. Immunization supporters thus could do more to highlight the sympathetic figures on their side, such as immune-compromised children who rely on herd immunity, or unvaccinated people who contracted vaccine-preventable diseases and regret not being vaccinated. We found that disease risk information bills were the only policy innovation during our study period from the proimmunization side; in other words, immunization supporters could certainly take the initiative to introduce a variety of proactive bills based on current events, much like the vaccine critics' attempts to pass mercury ban and ingredient bills. For example, a bill could require that schools and day care centers publicly post or distribute to parents the percentage of students with vaccine exemptions or the percentage of staff who have received a flu shot or whooping cough booster, as news coverage of disease outbreaks has raised public awareness about the unvaccinated. Although these numbers already have been collected, their public release would generate the news coverage

and scrutiny that have proved helpful in the West Coast's legislative changes. States with high rates of philosophical exemptions and lax procedures also may be suitable targets for new requirements specifying that parents (or students) talk with a physician before obtaining an exemption. Indeed, the Colorado legislature considered House Bill 14-1288, which included making school exemption data publicly available and requiring discussions with a health care professional (or the completion of an online education module) before obtaining an exemption. The bill that eventually passed did not include the health care professional discussion or education requirement. We believe that even as immunization supporters lament high exemption rates and worry about the recurrence of vaccine-preventable diseases, the political trajectories of vaccine controversies in the states portend a positive trend back in their favor.

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