

# Nudging Towards Vaccination: A Behavioral Law and Economics Approach to Childhood Immunization Policy\*

## I. Introduction

The Bill & Melinda Gates Foundation declared this decade “the Decade of Vaccines.”<sup>1</sup> Vaccines are more effective and protect against more diseases than ever before;<sup>2</sup> yet childhood immunization rates in the United States and many other industrialized nations are declining.<sup>3</sup> Diseases that had been declared eradicated in the United States are increasingly reappearing.<sup>4</sup> Most recently in early 2015, a large multistate measles outbreak was linked to an infected individual who had visited Disneyland in Southern California. A study concluded that the outbreak was likely a result of substandard vaccination rates.<sup>5</sup>

The anti-vaccination movement can be traced to a paper published by British doctor Andrew Wakefield in 1998 that claimed there might be a connection between the measles, mumps, and rubella (MMR) vaccine and

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1. *Vaccine Delivery: Strategy Overview*, BILL & MELINDA GATES FOUND., <http://www.gatesfoundation.org/What-We-Do/Global-Development/Vaccine-Delivery> [<http://perma.cc/XQY4-F9GC>].

2. *Ensuring Vaccine Safety*, CENTERS FOR DISEASE CONTROL & PREVENTION, <http://www.cdc.gov/vaccinesafety/ensuringsafety/index.html> [<http://perma.cc/QWP8-3G3V>]; see *Vaccine History: Developments by Year*, CHILD. HOSP. PHILA., <http://www.chop.edu/centers-programs/vaccine-education-center/vaccine-history/developments-by-year#.VjzpG4Qd5Xs> [<http://perma.cc/YW5M-XJGL>] (describing the development of vaccines and listing the recommended vaccines over time).

3. See *Figure Depicting Coverage with Individual Vaccines from the Inception of NIS, 1994 Through 2012*, CENTERS FOR DISEASE CONTROL & PREVENTION, <http://www.cdc.gov/vaccines/imz-managers/coverage/nis/child/figures/2012-map.html> [<http://perma.cc/8VVM-FMA7>] (showing a decline in the use of several vaccines in recent years).

4. See, e.g., *Measles Cases and Outbreaks*, CENTERS FOR DISEASE CONTROL & PREVENTION, <http://www.cdc.gov/measles/cases-outbreaks.html> [<http://perma.cc/4VKX-QAC4>] (reporting a record number of measles cases in the U.S. in 2014 after measles was documented as eliminated in the United States in 2000); *Pertussis Cases by Year (1922–2014)*, CENTERS FOR DISEASE CONTROL & PREVENTION, <http://www.cdc.gov/pertussis/surv-reporting/cases-by-year.html> [<http://perma.cc/52TX-68SJ>] (documenting the number of reported pertussis cases in the United States reached a low of 1,010 in 1976 but climbed back up to 32,971 in 2014); Lauren Gambino, *California Measles Outbreak Fueled by Parents Who Failed to Vaccinate Children – Study*, GUARDIAN (Mar. 17, 2015, 1:25 PM), <http://www.theguardian.com/us-news/2015/mar/17/measles-california-disneyland-vaccination-research> [<http://perma.cc/SJP2-22CX>] (“Health officials declared measles eliminated in the US in 2000 after decades of intensive childhood vaccine efforts led to widespread vaccination.”).

5. Maimuna S. Majumder et al., Letter, *Substandard Vaccination Compliance and the 2015 Measles Outbreak*, 169 JAMA PEDIATRICS 494, 494 (2015).

autism.<sup>6</sup> The study has since been widely discredited.<sup>7</sup> Not only was the study scientifically unsound, it was subsequently discovered that Wakefield had received around half a million British pounds from a lawyer preparing a class action against a producer of the MMR vaccine and that there were plans to start a company to sell diagnostic tests.<sup>8</sup> *The Lancet*, the journal that originally published the article, retracted it, and the United Kingdom's General Medical Council revoked Wakefield's medical license.<sup>9</sup> Nonetheless, the effects of the study still linger, and medical professionals attribute the growing clusters of parents who are refusing standard vaccinations to the study's lasting impact.<sup>10</sup>

There is concern about the growing anti-vaccination movement and its dangerous implications.<sup>11</sup> Successful eradication of vaccine-preventable disease depends on what scientists call "herd immunity."<sup>12</sup> That is because vulnerable people—like newborns and individuals receiving chemotherapy or immunosuppressive drugs—depend on the immunity of those around them to protect them from dangerous diseases. If there are enough people immunized against a disease within a community, it helps protect those who cannot be immunized. The percentage of people that must be vaccinated in order to establish herd immunity varies for each disease; for example, to keep measles from spreading, about 95% of the community needs to be vaccinated.<sup>13</sup> While the average national vaccination rate falls above 90%,<sup>14</sup>

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6. Clyde Haberman, *A Discredited Vaccine Study's Continuing Impact on Public Health*, N.Y. TIMES (Feb. 1, 2015), [http://www.nytimes.com/2015/02/02/us/a-discredited-vaccine-study-continuing-impact-on-public-health.html?\\_r=0](http://www.nytimes.com/2015/02/02/us/a-discredited-vaccine-study-continuing-impact-on-public-health.html?_r=0) [<http://perma.cc/P77R-46KG>].

7. *Id.* ("Dozens of epidemiological studies found no merit to [Wakefield's] work, which was based on a tiny sample. The British Medical Journal went so far as to call his research 'fraudulent.'"); see also Seth Mnookin, *Why So Many Parents Are Delaying or Skipping Vaccines*, COMMUNITY TABLE (Oct. 7, 2012, 5:00 AM), <http://communitytable.com/109306/sethmnookin/07-why-so-many-parents-are-delaying-vaccines/> [<http://perma.cc/LU6Z-T4D9>] ("Over the past decade, dozens of peer-reviewed studies that have collectively drawn on data from millions of children have consistently found no connection between vaccines and autism.").

8. See Brian Deer, *Revealed: Secret Payments to MMR Doctor Wakefield at Heart of Vaccine Crusade*, BRIANDEER.COM, <http://briandeer.com/wakefield/legal-aid.htm> [<http://perma.cc/9C8Q-YYBP>] (showing that £439,553 had been paid to Dr. Wakefield in experts' fees and expenses). See generally Brian Deer, *How the Case Against the MMR Vaccine Was Fixed*, 342 BMJ 77 (2011).

9. John F. Burns, *British Medical Council Bars Doctor Who Linked Vaccine with Autism*, N.Y. TIMES (May 24, 2010), [http://www.nytimes.com/2010/05/25/health/policy/25autism.html?\\_r=0](http://www.nytimes.com/2010/05/25/health/policy/25autism.html?_r=0) [<http://perma.cc/2X9V-PTTK>].

10. Mnookin, *supra* note 7.

11. See Majumder, *supra* note 5, at 494 ("The ongoing measles outbreak linked to the Disneyland Resort in Anaheim, California, shines a glaring spotlight on our nation's growing antivaccination movement and the prevalence of vaccination-hesitant parents.").

12. Emily Willingham & Laura Helft, *What is Herd Immunity?*, PBS: NOVA (Sept. 5, 2014), <http://www.pbs.org/wgbh/nova/body/herd-immunity.html> [<http://perma.cc/7RF4-F436>].

13. *Id.*

14. Laurie D. Elam-Evans et al., *National, State, and Selected Local Area Vaccination Coverage Among Children Aged 19–35 Months — United States, 2013*, 63 MORBIDITY &

clusters of communities around the country have rates that fall far below that threshold, creating cause for concern.<sup>15</sup> In the wake of the recent outbreaks, such as the one in California in early 2015, doctors and state legislators are looking for more effective ways to increase child immunization rates to levels that would accomplish herd immunity.

This Note uses insights from behavioral law and economics to offer a new perspective on how this goal might be achieved.<sup>16</sup> A variety of cognitive biases come into play when parents decide whether to vaccinate their children. These biases work together to cause predictable errors in risk assessment. An understanding of these biases is essential to those who wish to shape more-effective vaccine policy; in particular, knowledge of these biases will allow physicians and policymakers to more effectively target anti-vaccine parents and, most importantly, parents who are undecided on the issue but vulnerable to the anti-vaccine message.

In order for vaccine policy to accomplish its goal of maximizing the number of immunized children, it should address these biases and attempt to counteract them. There is a range of regulatory possibilities. At one end, we have the status quo: states requiring children to be vaccinated before enrolling in school but providing medical, religious, and philosophical exemptions. On the other end, we have the paternalistic approach: strict childhood vaccine requirements with no personal-belief exemptions. Somewhere in between lies the “libertarian paternalistic” approach: using debiasing strategies and nudging techniques, such as default rules, to counteract the risk-assessment errors resulting from cognitive biases.<sup>17</sup>

In this Note, I argue that the intermediate approach is the best option in the current political climate. Granted, the paternalistic approach would likely be most effective in terms of simply maximizing the number of children

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MORTALITY WKLY. REP. 741, 741 (2014), <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6334a1.htm> [<http://perma.cc/7X97-FM47>].

15. See generally Tracy A. Lieu et al., *Geographic Clusters in Underimmunization and Vaccine Refusal*, 135 PEDIATRICS 280 (2015).

16. Note that this is not the first scholarly work to examine the vaccination problem from a behavioral law and economics standpoint. See generally, Alexander Cappelen et al., *Demand for Childhood Vaccination—Insights from Behavioral Economics*, 37 F. FOR DEV. STUD. 349 (2010) (discussing how behavioral economics can shed light on the complex decision-making process for caretakers deciding whether to vaccinate children); Ljiljana Stanic, *Private Irrationality and Public Health: Failure to Vaccinate and What We Can Do About It*, 22 HEALTH L. REV. 49 (2014) (examining three groups of individuals who refuse or otherwise do not obtain vaccinations through a behavioral-economics lens and proposing policy solutions for each group). However, the particular policy solutions offered herein are unique—specifically, these solutions seek to counteract the major cognitive biases implicated when parents decide whether to vaccinate their children while simultaneously exploiting other biases that have the potential to push vaccine-hesitant parents towards vaccination. Also note that this Note, unlike others, does not focus on the ethical implications of adopting a libertarian paternalistic approach.

17. For a detailed discussion of the theory of libertarian paternalism, see generally Cass R. Sunstein & Richard H. Thaler, *Libertarian Paternalism Is Not an Oxymoron*, 70 U. CHI. L. REV. 1159 (2003).

vaccinated. After all, Mississippi—one of the two states that permit neither religious nor philosophical exemptions for childhood vaccinations—has the highest vaccination rate in the country.<sup>18</sup> However, the libertarian paternalistic approach will increase vaccination rates while still preserving parental autonomy and freedom of choice; consequently, such an approach will minimize constitutional issues and help to ease distrust towards “Big Pharma.” Because regulations under this approach will be less controversial and less susceptible to backlash from anti-vaccine activists than regulations attempting to eliminate exemptions, they are more likely to be approved by state legislatures and less likely to be successfully challenged if approved.

The arguments in this Note are based on the assumption that the benefits of immunization significantly outweigh any associated risks. This assumption is widely accepted in the medical field, and there is a strong consensus in the medical-science community that there is no causal link between vaccines and autism.<sup>19</sup> Accordingly, I propose solutions that would have the effect of increasing the number of children who are vaccinated. Further, this Note does not go into depth about the constitutional issues surrounding the vaccine debate, other than to note that certain regulatory approaches will minimize them while others will be more problematic. Finally, this Note recognizes that parents who are adamantly anti-vaccine are extremely difficult to convince otherwise.<sup>20</sup> As such, the focus here is primarily on how to affect parents at the margins—those who are susceptible to the anti-vaccine message but whose preferences are not hard-and-fast and thus are still capable of being manipulated. I refer to these parents as “vaccine hesitant.”<sup>21</sup>

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18. Alan Blinder, *Mississippi, a Vaccination Leader, Stands by Its Strict Rules*, N.Y. TIMES (Feb. 4, 2015), <http://www.nytimes.com/2015/02/05/us/mississippi-a-leader-on-vaccination-rates-stands-by-strict-rules.html> [http://perma.cc/Q789-NV3K].

19. *Vaccines Do Not Cause Autism*, CENTERS FOR DISEASE CONTROL & PREVENTION, <http://www.cdc.gov/vaccinesafety/Concerns/Autism/Index.html> [http://perma.cc/X8Y6-NLC3]; see also Kumanan Wilson et al., *Association of Autistic Spectrum Disorder and the Measles, Mumps, and Rubella Vaccine: A Systematic Review of Current Epidemiological Evidence*, 157 ARCHIVES PEDIATRICS & ADOLESCENT MED. 628, 633 (2003) (concluding that current medical literature suggests no association between the measles, mumps, and rubella vaccine and autistic spectrum disorder); Mnookin, *supra* note 7 (describing how “dozens of peer-reviewed studies” in recent years have revealed no tie between autism and vaccines); *Vaccine Studies: Examine the Evidence*, HEALTHYCHILDREN.ORG, <https://healthychildren.org/english/safety-prevention/immunizations/pages/vaccine-studies-examine-the-evidence.aspx> [http://perma.cc/N4XJ-DWQC] (providing a list of studies that have shown that vaccines do not cause autism).

20. See Dina Fine Maron, *How to Get More Parents to Vaccinate Their Kids*, SCI. AM. (Feb. 19, 2015), <http://www.scientificamerican.com/article/how-to-get-more-parents-to-vaccinate-their-kids/> [http://perma.cc/CD5G-B52H] (“[T]he sweet spot for intervention are parents that are on the fence, not those who have already decided against vaccines.”).

21. It is unclear exactly what percent of parents are vaccine hesitant, as that number tends to vary across communities and demographics. See Philip J. Smith et al., *Parental Delay or Refusal of Vaccine Doses, Childhood Vaccination Coverage at 24 Months of Age, and the Health Belief Model*, 126 PUB. HEALTH REP. 135, 141 tbl.3 (2011) [hereinafter Smith et al., *Parental Delay*].

The remainder of this Note is organized as follows: Part II describes the current state of childhood immunization policy and its weaknesses. Part III elaborates on the cognitive biases that affect parents' risk assessment in deciding whether or not to vaccinate their children. Part IV utilizes these behavioral law insights to explore potential regulatory responses to the nation's growing anti-vaccination movement. Part V concludes.

## II. The Current Climate of Childhood Immunization Policy

Childhood immunization requirements are governed by state law. All fifty states require certain vaccinations for school children; these requirements apply to students at public schools and often even extend to children attending private schools and day-care facilities.<sup>22</sup> However, there are exemptions available to parents who do not wish to vaccinate their children: all fifty states allow medical exemptions, all but three allow religious exemptions, and twenty currently allow philosophical exemptions (also called personal-belief exemptions in some states).<sup>23</sup> This Note focuses on the third category. While medical and religious exemptions have more stringent requirements, philosophical exemptions are easier to obtain and are therefore frequently used by anti-vaccination parents who wish to avoid immunizing their children.

Since the publication of Andrew Wakefield's article linking autism to the MMR vaccine, anti-vaccination sentiment has been on the rise.<sup>24</sup> This

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(showing sociodemographic characteristics among households with children aged 24–35 months by parental vaccine delay refusal category); Michael J. Smith, *Promoting Vaccine Confidence*, 29 *INFECTIOUS DISEASE CLINICS N. AM.* 759, 760–61 (2011) (noting that “vaccine hesitancy can be difficult to measure”). However, a 2009 study found that 25.8% of parents delayed one or more recommended vaccine doses, 8.2% refused one or more recommended vaccine doses, and 5.8% delayed and refused recommended vaccine doses. Smith et al., *Parental Delay*, *supra*, at 137. Because of the rise in vaccine hesitancy, these numbers are likely higher today. See, e.g., *supra* note 3 and accompanying text. Depending on how broadly we define “vaccine hesitancy,” these figures suggest that anywhere from 10% to 40% of parents are vaccine hesitant. In the context of herd immunity, where small reductions in immunization rates can trigger outbreaks, that number is significant.

22. *State Vaccination Requirements*, CENTERS FOR DISEASE CONTROL & PREVENTION, <http://www.cdc.gov/vaccines/imz-managers/laws/state-reqs.html> [<http://perma.cc/D58M-87WX>].

23. *States with Religious and Philosophical Exemptions from School Immunization Requirements*, NAT'L CONF. ST. LEGISLATURES (July 6, 2015), <http://www.ncsl.org/research/health/school-immunization-exemption-state-laws.aspx> [<http://perma.cc/42E3-PT5U>] (“Twenty states allow philosophical exemptions for those who object to immunizations because of personal, moral or other beliefs. As a result of legislation passed in 2015, two of those states—California and Vermont—will no longer allow philosophical exemptions beginning in July 2016, bringing the number of states that allow philosophical exemptions to eighteen.”).

24. See Heidi J Larson et al., *Addressing the Vaccine Confidence Gap*, 378 *LANCET* 526, 528 (2011) (asserting that Andrew Wakefield's article kindled “widespread fears”); Majumder, *supra* note 5, at 494 (stating that the recent measles outbreak linked to Disneyland “shines a glaring spotlight on our nation's growing antivaccination movement and the prevalence of vaccination-hesitant parents”). But see DAN M. KAHAN, *VACCINE RISK PERCEPTIONS AND AD HOC RISK COMMUNICATION: AN EMPIRICAL ASSESSMENT* 6–8 (2014), <http://papers.ssrn.com/sol3/papers>

sentiment is particularly prevalent in the media. For example, Jenny McCarthy, a former television host and Playboy Playmate, has been vocal for years about her belief that vaccines caused her son's autism.<sup>25</sup> McCarthy's views were featured on Oprah, on CNN's Larry King, and in Time Inc.'s People Magazine, bringing her to the forefront of America's attention.<sup>26</sup> With the help of mass media, she became the face of the modern "anti-vaxx" movement.<sup>27</sup> Robert Kennedy Jr. has also been an increasingly vocal anti-vaccine activist.<sup>28</sup> He has given speeches at anti-vaccine conferences and testified before Congress, various state legislatures, and the Centers for Disease Control and Prevention (CDC).<sup>29</sup> His advocacy has centered primarily on thimerosal, an antifungal and antiseptic agent once used widely in childhood vaccines but which was taken out of those vaccines in 2001.<sup>30</sup> While there is no evidence that supports a link between the trace amounts of thimerosal in vaccines and any brain disorders,<sup>31</sup> Kennedy edited a book, *Thimerosal: Let the Science Speak*, that contends that it causes numerous neurodevelopmental disorders, including autism.<sup>32</sup> His views, including "how government health agencies colluded with Big Pharma to hide the risks of thimerosal from the public," were featured in *Rolling Stone* magazine, on *The Daily Show with Jon Stewart*, and on MSNBC.<sup>33</sup>

Organizations like AutismOne and the National Vaccine Information Center have also been extremely vocal about their beliefs concerning the link between vaccines and autism.<sup>34</sup> These organizations' websites appear

.cfm?abstract\_id=2386034 [http://perma.cc/645H-7WJH] (arguing that there is not valid "empirical support for asserting that there is a 'growing distrust of vaccinations'").

25. SETH MNOOKIN, *THE PANIC VIRUS: A TRUE STORY OF MEDICINE, SCIENCE, AND FEAR* 252–61 (2011).

26. Michael Hiltzik, *Jenny McCarthy: Anti-Vaxxer, Public Menace*, L.A. TIMES (Jan. 27, 2015), <http://www.latimes.com/business/hiltzik/la-fi-mh-jenny-mccarthy-antivaxxer-public-menace-20150127-column.html#page=1> [http://perma.cc/D6EN-DWTA].

27. Retro Report, *Vaccines: An Unhealthy Skepticism*, N.Y. TIMES (Feb. 2, 2015), <http://www.nytimes.com/video/us/100000003485198/vaccines-an-unhealthy-skepticism.html> [http://perma.cc/Q22D-ZG2C] ("Jenny McCarthy has had more to do with popularizing the notion that vaccines are dangerous than any other single person in the United States.").

28. Keith Kloor, *Robert Kennedy Jr.'s Belief in Autism-Vaccine Connection, and its Political Peril*, WASH. POST (July 18, 2014), [http://www.washingtonpost.com/lifestyle/magazine/robert-kennedy-jrs-belief-in-autism-vaccine-connection-and-its-political-peril/2014/07/16/f21c01ee-f70b-11e3-a606-946fd632f9f1\\_story.html](http://www.washingtonpost.com/lifestyle/magazine/robert-kennedy-jrs-belief-in-autism-vaccine-connection-and-its-political-peril/2014/07/16/f21c01ee-f70b-11e3-a606-946fd632f9f1_story.html) [http://perma.cc/35QS-ZLZX].

29. E.g., *id.*; Saerom Yoo, *Robert F. Kennedy to Oregon Lawmakers: Reject Vaccine Bill*, STATESMAN J. (Mar. 6, 2015, 11:22 AM), <http://www.statesmanjournal.com/story/news/health/2015/03/06/robert-kennedy-jr-oregon-lawmakers-reject-vaccine-bill/24484317/> [http://perma.cc/F9QK-M247].

30. See Kloor, *supra* note 28.

31. *Thimerosal in Vaccines*, CENTERS FOR DISEASE CONTROL & PREVENTION, <http://www.cdc.gov/vaccinesafety/Concerns/thimerosal/> [http://perma.cc/QK6S-AJJU].

32. Kloor, *supra* note 28.

33. *Id.*

34. AUTISMONE, <http://www.autismone.org> [http://perma.cc/FG4U-E62G]; NATIONAL VACCINE INFORMATION CENTER, <http://www.nvic.org> [http://perma.cc/L4FH-89N9].

deceivingly disinterested, claiming to promote a “pro-science” and not an “anti-vaccine” agenda. In fact, however, organizations like these have discovered that the anti-vaccine message can be quite profitable. They hold annual conferences where they host speakers like father–son anti-vaccine duo Mark and David Geier, who spoke at the 2009 annual AutismOne conference promoting a treatment called the “Lupron protocol”—a drug used to chemically castrate sex offenders—as the cure to autism.<sup>35</sup> Finally, adding themselves into the anti-vaccine mix, a number of documentaries have been released in the past several years questioning the safety of vaccines and pointing a finger at the relationship between pharmaceutical companies and the government.<sup>36</sup>

These voices all have one thing in common: they instill fear in parents who are overwhelmed by the amount and complexity of the information and data regarding vaccine safety.<sup>37</sup> The activists know how to capitalize on this fear. Recently, in response to proposed legislation in California that would eliminate personal-belief exemptions, an anti-vaccine group in Minnesota “purchased airtime for what they describe as a ‘public service announcement’”; the thirty-second ad showed a clip of an infant having a seizure, suggesting this condition is a result of the child’s vaccination.<sup>38</sup> Unfortunately, it is clear that these scare tactics are working. In a study published in 2013, 20% of respondents said they believe that doctors and the government “still want to vaccinate children even though they know these vaccines cause autism and other psychological disorders.”<sup>39</sup> Sixty-nine percent of respondents said they have at least heard the claim before—this fact alone is cause for concern, since 36% of respondents said they were

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35. See MNOOKIN, *supra* note 25, at 16–17 (noting that the Geiers’ clinics charged clients up to \$70,000 per year for the Lupron treatment and describing a host of other products marketed to parents of children with autism).

36. See, e.g., BOUGHT (Jeff Hays Films 2015) (alleging harmful collusion between business and government in the fields of vaccination, medication, and food); SHOTS IN THE DARK (Play Films 2008) (detailing the expansion of child-immunization schedules and the potential negative health consequences); THE GREATER GOOD (BNP Pictures 2011) (profiling families that claim harm from vaccinations); TRACE AMOUNTS (FAZE Films 2015) (examining the use of mercury in vaccines and exploring the purported link between such vaccines and autism); VACCINE NATION (Gary Null and Associates, Inc. 2008) (arguing that vaccines cause symptoms easily mistaken for Shaken Baby Syndrome, as well as a host of other diseases and disorders).

37. See MNOOKIN, *supra* note 25, at 10 (discussing an anti-vaccine parent who decided to delay his child’s shots because “there was so much conflicting information out there he hadn’t known what to do”).

38. Abby Ohlheiser, *Shock Ads, the Holocaust and Domain Squatting: The Intense Fight Over a New California Vaccine Bill*, WASH. POST (Apr. 8, 2015), <http://www.washingtonpost.com/blogs/govbeat/wp/2015/04/08/shock-ads-the-holocaust-and-domain-squatting-the-intense-fight-over-a-new-california-vaccine-bill/> [http://perma.cc/6QDB-V9BU].

39. J. Eric Oliver & Thomas Wood, Letter, *Medical Conspiracy Theories and Health Behaviors in the United States*, 174 JAMA INTERNAL MED. 817, 817 tbl.1 (2014).

undecided on the issue, leaving them potentially vulnerable to the anti-vaccination message.<sup>40</sup>

The current childhood immunization system poses a problem because philosophical exemptions are relatively easy to obtain.<sup>41</sup> Accordingly, the system makes it easy for individuals to be swayed by their cognitive biases and by popular sentiment. As one might expect, states that allow philosophical exemptions have higher incidence of vaccine-preventable diseases.<sup>42</sup> Additionally, the use of philosophical exemptions—and general refusal to vaccinate—tends to cluster geographically, making certain communities especially susceptible to outbreaks.<sup>43</sup> This is particularly problematic in the context of herd immunity, where even a small decrease in immunization rates can trigger an outbreak.

Failures of the current approach to childhood-vaccine regulation are not hard to find. Most recently, an infected individual who visited Disneyland in Anaheim, California, triggered a multistate measles outbreak. From December 28, 2014 to February 11, 2015, 125 people in seven states were diagnosed with the highly contagious disease.<sup>44</sup> A recent study concluded that the outbreak was probably a result of substandard vaccination rates.<sup>45</sup> Specifically, researchers calculated that the vaccination rate among those who had been exposed to measles during the outbreak was no higher than 86% and might have been as low as 50%.<sup>46</sup>

Many states have reacted to such recent outbreaks by attempting to pass new legislation that would limit available exemptions to childhood immunization requirements.<sup>47</sup> This demonstrates a concern that the current system is not working well enough. It also demonstrates the need for innovative approaches. For example, Oregon now requires a parent claiming a

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40. *Id.*

41. See David M. Salisbury, *Should Childhood Vaccination Be Mandatory? No*, 344 *BMJ* 18, 19 (2012) (“[E]xemptions to the state [vaccination] laws are easily obtained on the basis of religious or personal beliefs.”).

42. Eileen Wang et al., *Nonmedical Exemptions from School Immunization Requirements: A Systematic Review*, 104 *AM. J. PUB. HEALTH* e62, e81–e82 (2014).

43. *Id.* at e81–e82; see also Lieu et al., *supra* note 15, at 285 (“Underimmunization and vaccine refusal cluster geographically, and the rates of these outcomes within clusters are far higher than outside them.”). For a graphical display of geographic clustering in California, see Matthew Bloch et al., *Vaccination Rates for Every Kindergarten in California*, *N.Y. TIMES* (Feb. 6, 2015), <http://www.nytimes.com/interactive/2015/02/06/us/california-measles-vaccines-map.html> [<http://perma.cc/9XTC-UJ4P>].

44. Jennifer Zipprich et al., *Measles Outbreak—California, December 2014–February 2015*, 64 *MORBIDITY & MORTALITY WKLY. REP.* 153, 153 (2015).

45. Majumder et al., *supra* note 5, at 494.

46. *Id.*

47. *States with Religious and Philosophical Exemptions from School Immunization Requirements*, *NAT’L CONF. ST. LEGISLATURES* (July 7, 2015), <http://www.ncsl.org/research/health/school-immunization-exemption-state-laws.aspx> [<http://perma.cc/N67B-MSVU>] (noting that “at least twelve states considered legislation addressing immunization exemptions” in 2015, and two states successfully removed philosophical exemptions).



nonmedical exemption to either obtain a signature from a healthcare practitioner verifying discussion of the risks and benefits of immunization (as is consistent with information published by the CDC), or to complete an interactive online educational video that presents information about the risks and benefits.<sup>48</sup> Earlier this year, the Oregon Senate contemplated going one step further by considering legislation that would eliminate philosophical exemptions entirely.<sup>49</sup> However, Senator Elizabeth Steiner Hayward, who had sponsored the bill, withdrew the bill “in response to mounting pressure from opponents.”<sup>50</sup> A similar bill was also rejected in Washington in March.<sup>51</sup>

Most recently, on June 30, 2015, California Governor Jerry Brown signed into law Senate Bill 277, eliminating religious and philosophical exemptions in the state.<sup>52</sup> The road to its passage was not a smooth one.<sup>53</sup> And despite the significant legislative victory, the law is already facing substantial challenges. Specifically, an effort is underway to collect signatures for a referendum to repeal it, and constitutional challenges have been threatened.<sup>54</sup> Professionals are also concerned about how effectively the law will be enforced.<sup>55</sup> This illustrates that outright elimination of exemptions may be too contentious and complex, and that a more creative approach to the vaccine issue is necessary.

### III. Cognitive Biases at Play in the Vaccination Decision

Standard economic theory posits that “all human behavior can be viewed as involving participants who [1] maximize their utility [2] from a stable set of preferences and [3] accumulate an optimal amount of information and other inputs in a variety of markets.”<sup>56</sup> But it has been shown that the rational-actor assumption does not actually provide an accurate conception of human behavior; rather, people’s judgments and decisions are

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48. OR. REV. STAT. § 433.267 (2014).

49. Ian K. Kullgren, *Vaccine Controversy: Oregon Senator Drops Bill to End Philosophical Exemption*, OREGONIAN (Mar. 11, 2015, 11:24 AM), [http://www.oregonlive.com/politics/index.ssf/2015/03/vaccine\\_controversy\\_oregon\\_sen.html](http://www.oregonlive.com/politics/index.ssf/2015/03/vaccine_controversy_oregon_sen.html) [http://perma.cc/4NDH-5UJV].

50. *Id.*

51. Sheila V. Kumar & Rachel La Corte, *Bills Banning Most Vaccine Exemptions Fail in Northwest*, SEATTLE TIMES (Mar. 11, 2015, 7:47 PM), <http://www.seattletimes.com/seattle-news/health/bills-banning-most-vaccine-exemptions-fail-in-northwest/> [http://perma.cc/FD6N-SN4D].

52. 2015 Cal. Stat. 91.

53. See, e.g., Michelle M. Mello et al., *Shifting Vaccination Politics — The End of Personal-Belief Exemptions in California*, 373 NEW ENG. J. MED. 785, 785 (2015) (“The passage of SB 277 was anything but a foregone conclusion. . . . The bill’s opponents mobilized fiercely against it, attending hearings with toddlers in tow and organizing strident protests. The pediatrician-senator who sponsored the bill received death threats.”).

54. *Id.* at 786.

55. *Id.*

56. GARY S. BECKER, *THE ECONOMIC APPROACH TO HUMAN BEHAVIOR* 14 (1976).

often limited by “bounded rationality, bounded willpower, and bounded self-interest.”<sup>57</sup> These bounds “draw into question the central ideas of utility maximization, stable preferences, rational expectations, and optimal processing of information,” and represent ways in which people depart from the standard economic model.<sup>58</sup>

Bounded rationality “refers to the obvious fact that human cognitive abilities are not infinite.”<sup>59</sup> We deal with this limitation by “us[ing] mental shortcuts and rules of thumb.”<sup>60</sup> Specifically, when we are called to make risk judgments and lack reliable knowledge or are faced with a complex array of data, we assess risk with the help of certain heuristics.<sup>61</sup> These heuristics are useful from an efficiency standpoint, but they pose a problem when they create a disconnect between actual judgments and unbiased forecasts and lead us to make predictable mistakes. This Part discusses the primary biases that might prevent parents from making a rational decision when deciding whether to vaccinate their child.

#### A. *The Availability Heuristic*

One of the most significant heuristics implicated in the childhood vaccination decision is the availability heuristic, “a pervasive mental shortcut whereby the perceived likelihood of any given event is tied to the ease with which its occurrence can be brought to mind.”<sup>62</sup> It is easy to see how this comes into play in the context of childhood immunizations. Parents underestimate the necessity of vaccinating their children because the diseases that vaccines protect against have no specific meaning to them.<sup>63</sup> It is difficult for parents to weigh the cost of not vaccinating because they cannot picture what it would be like for their child to become ill or die of a disease with which they have no experience. Thus, the great paradox about vaccines: “The more effective they are, the less necessary they seem.”<sup>64</sup>

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57. Christine Jolls, Cass R. Sunstein & Richard Thaler, *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471, 1476 (1998) (emphasis omitted).

58. *Id.*

59. *Id.* at 1477.

60. *Id.*

61. *Id.*

62. Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 STAN. L. REV. 683, 685 (1999).

63. See Julie Ball, *More Buncombe Parents Reject Vaccinations*, CITIZEN-TIMES (Apr. 12, 2014, 4:23 PM), <http://www.citizen-times.com/story/news/local/2014/04/12/buncombe-parents-reject-vaccinations/7645527/> [<http://perma.cc/43YB-B8WA>] (quoting a medical director at a children’s hospital as positing that “because we’ve been so successful [at preventing disease through vaccination], families, parents, they don’t know what we’re preventing. They haven’t experienced it.”); Haberman, *supra* note 6 (quoting Seth Mnookin, author of a book about vaccinations and the anti-vaccine movement, as stating “you might as well be protecting against aliens—these are things [parents have] never seen”).

64. MNOOKIN, *supra* note 25, at 20.

Autism, on the other hand, affects one out of sixty-eight children in America.<sup>65</sup> Almost every person has some knowledge about the disorder and likely some amount of personal experience with it.<sup>66</sup> This prevalence plays a significant role in risk evaluation when parents are deciding whether or not to immunize their children. The “over-availability” of autism and the anti-vaccine message works together with the “under-availability” of vaccine-preventable diseases to cause parents to faultily overestimate the potential harm and underestimate the benefits of childhood inoculation.

### B. *Availability Cascades*

The effects of the availability heuristic aggregate and set off cascades of misperception. Kuran and Sunstein define an availability cascade as a “self-reinforcing process of collective belief formation by which an expressed perception triggers a chain reaction that gives the perception increasing plausibility through its rising availability in public discourse.”<sup>67</sup> These cascades result when availability is “amplified by socially shaped informational cues and reputational incentives;” in other words, social processes compound the effects of the availability heuristic.<sup>68</sup> Put more simply, people often believe something because other people believe it, or they pretend to believe it to avoid reputational harm. These cascades create a significant danger of widespread misperceptions about risks.

Despite the fact that the 1998 study linking vaccines to autism has been widely rejected, the conversation still lingers, keeping the issue on Americans’ radars. Figures like Jenny McCarthy and Robert Kennedy,<sup>69</sup> shock ads like the one recently aired in Minnesota,<sup>70</sup> documentaries like *Trace Amounts*,<sup>71</sup> and deceiving anti-vaccine websites that hold themselves out to be neutral<sup>72</sup> all work together to make it appear that more individuals are opposed to vaccination than is actually the case. Simultaneously, one loud message is hammered into parents’ minds: that vaccines—and those who recommend them—cannot be trusted.<sup>73</sup>

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65. *Autism Spectrum Disorder (ASD): Data and Statistics*, CENTERS FOR DISEASE CONTROL & PREVENTION, <http://www.cdc.gov/ncbddd/autism/data.html> [<http://perma.cc/E4VE-N5RS>].

66. Even if that experience only comes from popular movies and television shows. Some examples include *I AM SAM* (New Line Film Productions Inc. 2001); *Parenthood* (NBC television broadcast 2010–2015); *RAIN MAN* (United Artists Pictures, Inc. 1988); and *WHAT’S EATING GILBERT GRAPE* (Paramount Pictures 1993).

67. Kuran & Sunstein, *supra* note 62, at 683.

68. *Id.* at 761.

69. See *supra* notes 25–33 and accompanying text.

70. See *supra* note 38 and accompanying text.

71. See *supra* note 36 and accompanying text.

72. See *AUTISMONE*, *supra* note 34; *supra* text accompanying note 34.

73. Andrea L. Benin et al., *Qualitative Analysis of Mothers’ Decision-Making About Vaccines for Infants: The Importance of Trust*, 117 *PEDIATRICS* 1532, 1537–38 (2006) (explaining how

These cascades become particularly dangerous in insular groups where feedback is poor. They help to explain why anti-vaccine parents tend to be found in clusters—towns and counties where immunization rates are significantly lower than the national and state averages.<sup>74</sup> These clusters are examples of local availability cascades. Individuals tend to surround themselves with like-minded people, resulting in increased polarization and promoting an “us versus them” mentality in these pockets of society. Interestingly, the residents of these clusters often “tend to be well off and well educated.”<sup>75</sup>

Availability cascades also play a role in perpetuating risk-assessment errors in online anti-vaccine communities. The Internet makes it “easier than not to fall down a wormhole of self-referential and mutually reinforcing links that make it feel like the entire world thinks the way you do.”<sup>76</sup> Anti-vaccine voices can create the impression online that a viewpoint has broad support when, in reality, only a small number of activists is necessary—or even just one really zealous one. Thus, while availability cascades are not new, the Internet and mass media have made them even more precarious than in the past.

### C. *The Affect Heuristic*

The availability heuristic interacts closely with the affect heuristic. There are two ways in which humans comprehend risk: the “analytic system,” which uses “logic, reason, and scientific deliberation,” and the “experiential system,” which comprises “our fast, instinctive, and intuitive reactions to danger.”<sup>77</sup> The experiential system “relies on images and associations, linked by experience to emotion and affect (a feeling that something is good or bad).”<sup>78</sup> Often, when we judge risks, the experiential (or “risk as feelings”) system overshadows the analytic system: “Using an overall, readily available affective impression can be easier than weighing the pros and cons . . . especially when the required judgment or decision is complex or mental resources are limited.”<sup>79</sup> Studies have shown that, “whereas risk and benefit

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mothers in a study felt alienated from the doctors because they had not yet chosen to vaccinate their children).

74. See, e.g., JENNIFER MULLENDORE, BUNCOMBE CTY. DEP’T OF HEALTH, VACCINE EXEMPTIONS: HOW YOU CAN HELP IMPROVE IMMUNIZATION RATES, <https://buncombecounty.org/common/health/ImmunizationRates.pdf> [<http://perma.cc/8GBM-FSSP>] (showing selected counties may have a higher rate of vaccination exemptions than the North Carolina statewide average); Lieu et al., *supra* note 15, at 283 (identifying geographic clusters of underimmunization in Northern California).

75. Haberman, *supra* note 6.

76. MNOOKIN, *supra* note 25, at 198.

77. Paul Slovic et al., *Risk as Analysis and Risk as Feelings: Some Thoughts about Affect, Reason, Risk, and Rationality*, 24 RISK ANALYSIS 311, 311, 313 tbl.1 (2004).

78. *Id.* at 311.

79. *Id.* at 314.

tend to be positively correlated in the world, [the affect heuristic causes them to be] negatively correlated in people's minds."<sup>80</sup> In other words, if people's feelings towards something are positive, they will judge the risks as low and the benefits as high; however, if their feelings towards something are negative, they tend to judge the risks as high and the benefits as low.

Slovic et al. hypothesized that the availability heuristic works "not only through ease of recall," but because "remembered images come tagged with affect."<sup>81</sup> This explains why people overestimate "frequencies of highly publicized causes of death" (e.g., homicides, airplane accidents, and tornados) and underestimate underpublicized causes (e.g., diabetes, stroke, and heart disease).<sup>82</sup> The affect heuristic, and its relationship with availability, is especially relevant in the context of the childhood-vaccination decision. Just as autism is more cognitively available to the average American than mumps or measles, autism also invokes a stronger emotional reaction and image than those diseases.<sup>83</sup> Autism has grown in the popular conscience as representations of the disease have spread in popular culture and parents have become more aware of the disease;<sup>84</sup> these associated images and narratives come prior to, and direct, judgments of risk and benefit.<sup>85</sup> Essentially, autism seems more frightening because it is more familiar, and it is more familiar because it seems more frightening.

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80. *Id.* at 315.

81. *Id.* at 317.

82. *Id.*

83. See Karen Kaplan, *Vaccine Refusal Helped Fuel Disneyland Measles Outbreak, Study Says*, L.A. TIMES (Mar. 16, 2015, 5:30 PM), <http://www.latimes.com/science/sciencenow/la-sci-sn-disneyland-measles-under-vaccination-20150316-story.html#page=1> [<http://perma.cc/Y6Y5-5P9U>] ("The problem is that some parents are more scared of the MMR vaccine than they are of the measles, said Dr. William Schaffner, a specialist in infectious diseases at Vanderbilt University's School of Medicine. In most cases, these parents have no first-hand experience with measles or other dangerous childhood illnesses that used to be common. 'They don't fear or respect measles, so they don't value the vaccine,' Schaffner said.")

84. See Mollie Bloudoff-Indelicato, "Increase" in Childhood Autism No Cause for Alarm: Experts, NAT'L GEOGRAPHIC (Mar. 30, 2014), <http://news.nationalgeographic.com/news/2014/03/140328-autism-spectrum-disorder-rates-cdc-health-science/> [<http://perma.cc/Z5CQ-A2KX>] (quoting the director of the A.J. Drexel Autism Institute as stating "[i]ncreased awareness among parents, schools, and organizations has led to more diagnoses"); Joanna Scuttis, *Autism and Asperger's in Popular Culture: A Biographile Primer*, SIGNATURE (Apr. 3, 2013), <http://www.signature-reads.com/2013/04/autism-and-aspergers-in-popular-culture-a-biographile-primer/> [<http://perma.cc/6C3M-CD9F>] (observing that as "representations of autism in popular culture" have become more common, people's "understanding of the effects of autism and Asperger's is shaped by what [they] see on television").

85. See MNOOKIN, *supra* note 25, at 2 (describing how a woman's chiropractor warned her about the dangers he believed the MMR vaccine presented, leading her to become fearful of having her son, Matthew, vaccinated. The woman reasoned: "Well, I'm surrounded by people who have autistic children. What if this happened to Matthew?").

*D. Betrayal Aversion*

Risk as feelings also manifests itself in the behavioral phenomenon of betrayal aversion. Humans have emotional reactions when the objects of our trust betray their implicit promise to protect against harm. The bias causes “people [to] select[] inferior products (in terms of overall risk exposure) over those that were associated with a slim chance of betrayal.”<sup>86</sup> In a study on the bias, one group of participants read the following passage before being asked to make a choice between two cars:

Suppose that you are offered a choice between two equally priced cars: Car A and Car B. Car A is equipped with Air Bag A. Scientific crash tests indicate that there is a 2% chance that drivers of Car A who are [i]n serious accidents will be killed due to the impact of the crash. Car B is equipped with Air Bag B. Scientific crash tests indicate that there is a 1% chance that drivers of Car B who are in serious accidents will die due to the impact of the crash. However, Car B may kill drivers who would not have died if they were driving Car A instead. Specifically, some drivers of Car B may die due to trauma caused by the force of the air bag deployment. Crash tests indicate that there is an additional one chance in 10,000 (0.01%) that someone who is in a serious accident in Car B will be killed due to air bag trauma.<sup>87</sup>

For a different group of participants, “the risk of death due to air bag deployment was replaced by a risk of death due to toxic fume inhalation from a damaged engine”—i.e., “not a betrayal of the safety device itself.”<sup>88</sup> Despite the fact that Car B had a lower overall risk of death (1.01% versus 2%), almost 73% of participants in the first group preferred Car A (the nonbetraying car).<sup>89</sup> However, 63.6% of participants in the second group chose Car B over Car A.<sup>90</sup> Participants in the betrayal group explained the rationale behind their choice: “‘If [the air bag] is supposed to help me stay alive, then I want the one that isn’t going to kill me on it’s [sic] own,’ and ‘I’d hate to have the air bag that’s supposed to save my life be the cause of its termination.’”<sup>91</sup> Typical explanations among those in the nonbetrayal group, on the other hand, were “‘Because with Car B there is a lower chance (1.01%) that drivers who are in accidents will die’ and ‘Why not improve your odds [of living] while you easily can?’”<sup>92</sup>

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86. Jonathan J. Koehler & Andrew D. Gershoff, *Betrayal Aversion: When Agents of Protection Become Agents of Harm*, 90 ORGANIZATIONAL BEHAV. & HUM. DECISION PROCESSES 244, 257 (2003).

87. *Id.* at 254.

88. *Id.*

89. *Id.* at 255 tbl.4.

90. *Id.*

91. *Id.* at 255 (first alteration in original).

92. *Id.* (alteration in original).

Koehler and Gershoff replicated the experiment in the vaccination context and found similar results: the majority of participants in the betrayal condition favored the vaccine that had the overall higher risk of death but that did not betray, while the majority of participants in the nonbetrayal condition favored the vaccine that minimized their overall risk of dying.<sup>93</sup> These experiments illustrate strikingly that “people are willing to accept an increased risk of the very thing they wish to prevent (death) to eliminate the mere chance of betrayal.”<sup>94</sup> The implications are grave: just as parents might forgo purchasing a car with an air bag whose protection vastly outweighs any small chance of betrayal, parents might refuse to inoculate their child despite the fact that the benefits of doing so far outweigh any associated risks. The affect heuristic and betrayal aversion together infuse the vaccination decision with an emotional charge, and consequently, the decision becomes one that many parents fear to make.

#### E. *The Omission Bias*

Betrayal aversion interacts closely with the “omission bias” when parents decide whether to vaccinate their child.<sup>95</sup> The omission bias refers to the tendency to “favor omissions over [otherwise equivalent] commissions, especially when either one might cause harm.”<sup>96</sup> Put more simply, people are more reluctant to risk a negative outcome as the result of performing an action. For example, people tend to prefer hypotheticals that involve them letting someone die over hypotheticals that involve them actively killing someone.<sup>97</sup> In the context of immunizations, this line of thinking is troublesome. In a 1990 study, Ritov and Baron found that the omission bias causes subjects to be reluctant to vaccinate a child “when the vaccine can cause bad outcomes, even if the outcomes of not vaccinating are worse.”<sup>98</sup> When asked to explain their reasons for deciding not to vaccinate at the optimal levels, many of the subjects discussed the issue of responsibility and guilt: “One is perceived to be more responsible for outcomes of commissions than for outcomes of omissions.”<sup>99</sup> One subject of the study wrote, “I feel that if I vaccinated my kid and he died I would be more responsible for his death than if I hadn’t vaccinated him and he died—sounds strange, I

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93. *Id.* at 255 tbl.4.

94. *Id.* at 257.

95. See Sean Hannon Williams, *Statistical Children*, 30 *YALE J. ON REG.* 63, 97 n.245 (2013) (noting that the fear that vaccines cause autism is “particularly resilient because it combines parents’ general fears about child safety with betrayal aversion and act/omission biases in attribution”).

96. Ilana Ritov & Jonathan Baron, *Reluctance to Vaccinate: Omission Bias and Ambiguity*, 3 *J. BEHAV. DECISION MAKING* 263, 263 (1990).

97. *Id.* at 263–64.

98. *Id.* at 275.

99. *Id.*

know.”<sup>100</sup> Another explained, “I did not want to risk killing the child with a vaccine that is optional. It would have been my fault if the child died from the vaccine.”<sup>101</sup>

There are still other biases and predilections—such as ambiguity aversion, gender differences in risk aversion, and cultural predispositions—that come into play in the childhood vaccination decision.<sup>102</sup> While I do not focus on these in this Note, their existence lends additional support to the idea that the vaccination decision is plagued by a variety of cognitive forces that prevent parents from making accurate and rational risk judgments.

#### IV. Regulatory and Policy Solutions

As illustrated by the preceding Part, the vaccination decision is often far from rational. It is largely affected by subconscious biases that result in parents underestimating the benefits of immunization and overestimating potential resulting harms. Additionally, as further illustrated in this Part, parents’ attitudes towards childhood immunization, like people’s preferences among different medical treatments, are “often inconsistent or easily overridden by subtle cognitive processes.”<sup>103</sup> Thus, childhood immunization appears to be an area that might benefit from regulation that confronts these biases and nudges<sup>104</sup>—or even shoves<sup>105</sup>—parents towards making smarter decisions for their children’s health.

100. *Id.*

101. *Id.*

102. See, e.g., Jacqueline R. Meszaros et al., *Cognitive Processes and the Decisions of Some Parents to Forego Pertussis Vaccination for Their Children*, 49 J. CLINICAL EPIDEMIOLOGY 697, 699–702 (1996) (studying ambiguity aversion where parents’ perceived ambiguity or doubts about the reliability of vaccine information were an important predictor in vaccination decisions); Sarah Tickner et al., *‘It’s Just the Normal Thing to Do’: Exploring Parental Decision-Making About the ‘Five-in-One’ Vaccine*, 25 VACCINE 7399, 7403 (2007) (noting that vaccination decisions were informed by the opinions of other family members and friends); Chian Jones Ritten, *Measuring Values for Environmental Public Goods: Incorporating Gender and Ethnic Social Effects Into Stated-Preference Value-Elicitation Methods* 133–34 (Summer 2011) (unpublished Ph.D. dissertation, Colorado State University) (on file with the Colorado State University library system) (noting “gender differences in willingness to pay for vaccination programs” as the result of risk aversion).

103. Jennifer Amsterlaw et al., *Can Avoidance of Complications Lead to Biased Healthcare Decisions?*, 1 JUDGMENT & DECISION MAKING 64, 65 (2006).

104. See RICHARD H. THALER & CASS R. SUNSTEIN, *NUDGE* 6 (2008) (“A nudge . . . is any aspect of the choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting the fruit at eye level counts as a nudge. Banning junk food does not.”).

105. In an interview, Sunstein clarified the distinction between a nudge and a shove: “A nudge clearly becomes a shove when it is mandatory, but the harder it is to opt out, the more a nudge turns into a shove.” Annika Mengisen, *From Push to Nudge: A Q&A with the Authors of the Latter*, FREAKONOMICS (Apr. 15, 2008, 2:43 PM), <http://freakonomics.com/2008/04/15/from-push-to-nudge-a-qa-with-the-authors-of-the-latter/> [<http://perma.cc/X9A8-R8EZ>]. A system that requires individuals to fill out forms or submit paperwork in order to opt out of a default, rather than simply



It is possible that, even without any regulatory action, there will be a sort of natural debiasing process that transpires as more outbreaks of vaccine-preventable diseases occur; that is, the more outbreaks there are, the more parents will recognize the importance of vaccinating their children. However, we should strive to address the problem before this organic debiasing process has to kick in so that we can avoid the outbreaks that would catalyze this process in the first place.

#### A. *Eliminating Personal-Belief Exemptions*

The most obvious approach to the problem of decreasing childhood immunization rates would be to eliminate personal-belief exemptions, since those are what allow biases to affect a parent's decision.<sup>106</sup> There is evidence that such an approach could be successful in terms of increasing the number of vaccinated children: "Mississippi does not allow parents to exempt their children from receiving vaccines for personal reasons, and the state has the highest vaccination rates in the country."<sup>107</sup> But this approach is also the most paternalistic, and as such, it implicates some significant issues. As an initial matter, the elimination of parental choice will agitate the already adversarial relationship between immunization advocates and anti-vaccination parents and will undoubtedly increase distrust towards the relationship between pharmaceutical companies and the government.

Most importantly, and most problematically, this approach will undeniably face severe opposition, and state legislatures will have a difficult time passing laws to this effect. Anti-vaccine parents will likely raise constitutional challenges, asserting that their parental autonomy and freedom of choice are violated by these exemption restrictions. In fact, several state legislatures that have recently attempted to eliminate the personal-belief exemption, in response to recent outbreaks, have failed in their efforts. For example, recently proposed legislation in the Oregon Senate that would eliminate philosophical exemptions was eventually withdrawn because of

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clicking a mouse or checking a box, is more of a shove than a nudge. *Id.* According to Sunstein, shoves are justifiable "[w]hen children and third parties are at risk." *Id.*

106. It should be noted that some states do not provide personal-belief exemptions but, instead, interpret their religious exemptions quite broadly. In those states, this solution would entail narrowing the scope of the religious exemption. For an example of a state that has done this, see IOWA ADMIN. CODE r. 641-7.3(2) (2014) (requiring that the immunization must conflict "with a genuine and sincere religious belief and that the belief is in fact religious and not based merely on philosophical, scientific, moral, personal, or medical opposition to immunizations").

107. Maron, *supra* note 20; see also Blinder, *supra* note 18; Todd C. Frankel, *Mississippi—Yes, Mississippi—Has the Nation's Best Child Vaccination Rate. Here's Why.*, WASH. POST (Jan. 30, 2015), <http://www.washingtonpost.com/news/storyline/wp/2015/01/30/mississippi-yes-mississippi-has-the-nations-best-child-vaccination-rate-heres-why> [<http://perma.cc/A59T-QM28>] (noting that in 2014, 99.7% of Mississippi's kindergarteners were fully vaccinated, and only 140 students in the state entered school without all of their required shots).

immense pressure from opponents.<sup>108</sup> A similar effort to limit exemptions in Washington also failed.<sup>109</sup> This illustrates that the paternalistic approach is probably not the most effective one, and legislators are learning this the hard way. This approach also risks generating a reactive response; just as prohibition policies massively failed to halt alcohol consumption, a simple elimination of vaccination exemptions could actually result in a drop in vaccination rates.<sup>110</sup>

### B. *The Libertarian Paternalistic Approach*

I argue that a less restrictive approach—often labeled “the libertarian paternalistic approach”—is a more workable solution. The term libertarian paternalism was coined by behavioral economists Richard Thaler and Cass Sunstein and refers to a regulatory system that “steer[s] people’s choices in directions that will improve the choosers’ own welfare” while simultaneously recognizing “that people should be ‘free to choose.’”<sup>111</sup> In the context of childhood immunizations, this approach would involve strategies such as setting defaults, increasing opt-out transaction costs, and framing information to combat, as well as capitalize on, biases. Because this approach “preserves freedom of choice,”<sup>112</sup> it will be more likely to garner support from both legislators and constituents. Hence, it will increase the number of vaccinated children while at the same time preserving parental autonomy and consequently minimizing potential constitutional issues.

1. *Framing Childhood Immunization as the Default.*—Under this approach, states would pass legislation requiring that doctors clearly frame and present vaccination as the default option to parents. Doing so will increase vaccination rates because of the “status quo bias,” which refers to the tendency of people to go along with the default option.<sup>113</sup> It is essentially “a fancy name for inertia.”<sup>114</sup> Remarkably, this phenomenon occurs even when opting out of the default choice is essentially costless. A real-life example of the status quo bias occurred in Pennsylvania and New Jersey in the late 1980s and early 1990s.<sup>115</sup> Both states offered residents a choice

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108. Kullgren, *supra* note 49.

109. See Kumar & La Corte, *supra* note 51.

110. See Edgar K. Marcuse, Commentary, *Prudent Personal Belief Exemption Policies*, 166 ARCHIVES PEDIATRICS & ADOLESCENT MED. 1093, 1094 (asserting that public-health programs depend on broad public consensus and citing prohibition as an example of a failed policy); Salisbury, *supra* note 41, at 19 (arguing that compulsion would be “unenforceable, unnecessary, and its use would probably do more harm than good”).

111. Sunstein & Thaler, *supra* note 17, at 1161–62.

112. *Id.* at 1201.

113. THALER & SUNSTEIN, *supra* note 104, at 7–8.

114. *Id.*

115. MARK J. MACHINA & W. KIP VISCUSI, 1 HANDBOOK OF THE ECONOMICS OF RISK AND UNCERTAINTY 681 (2014).

between two types of automobile insurance: a cheaper policy that restricted the insured person's right to sue for damages from accidents, and a more expensive one with an unrestricted right to sue.<sup>116</sup> New Jersey made the limited-rights policy its default, while Pennsylvania set the expensive policy as the default option.<sup>117</sup> Despite the fact that individuals in both states were free to opt for the other policy, the default option in both states was more popular than the alternative.<sup>118</sup>

There is evidence showing that framing childhood vaccination as an opt-out decision could work to increase immunization rates. A recent study found that how physicians initiate their vaccine recommendations at healthcare visits is an important determinant of parent resistance to that recommendation.<sup>119</sup> In the study, pediatricians who used an opt-out communication style (e.g., "Well, we have to do some shots today."), as opposed to those who used an opt-in communication style (e.g., "What would you like to do about shots today?"), were associated with greater parental acceptance of childhood vaccines.<sup>120</sup> Specifically, 83% of parents resisted vaccine recommendations when providers used the participatory (opt-in) initiation format, whereas only 26% resisted when the provider adopted a presumptive (opt-out) format.<sup>121</sup> This finding remained true among those parents in the study who were classified as "vaccine hesitant": 89% resisted vaccine recommendations with the participatory style and 30% resisted with the presumptive style.<sup>122</sup>

Legislators and healthcare providers can harness the power of the status quo by setting default options that align with their policy goals. Defaults are unavoidable. When doctors initiate their vaccine recommendations in a participatory style, they have—probably unintentionally—designed an opt-in system. But if doctors are interested in increasing the number of appointments made, an opt-out system would prove much more effective. I propose that legislators, rather than seeking to eliminate religious and personal-belief exemptions, should seek to enact regulations mandating doctors to frame vaccination as the default option. There will likely be little pushback to this type of regulation, since the vast majority of doctors support childhood immunization and are often in search of guidance as to how to convince their patients to vaccinate.<sup>123</sup> Further, this type of legislation is

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116. *Id.*

117. *Id.*

118. *Id.*

119. Douglas J. Opel et al., *The Architecture of Provider-Parent Vaccine Discussions at Health Supervision Visits*, 132 *PEDIATRICS* 1, 4–5 (2013).

120. *Id.* at 4.

121. *Id.*

122. *Id.*

123. See Lisa Aliferis, *Training Doctors to Talk About Vaccines Fails to Sway Parents*, NPR (June 1, 2015, 11:04 AM), <http://www.npr.org/sections/health-shots/2015/06/01/411188093/>

likely to get little pushback from anti-vaccine parents—certainly less than legislation seeking to eliminate exemptions—since it preserves their autonomy and freedom of choice.

The ideal regulation would provide physicians with a list of steps to follow in order to ensure that the vaccination decision is framed in such a way as to capitalize on the status quo bias. The steps would look something like the following: Parents typically take their babies for check-ups at one month and again at two months; the two-month appointment is where babies usually receive their first batch of vaccines.<sup>124</sup> At this appointment, under my proposal, the doctor would inform the parent that the baby will be getting her shots; it is imperative that the doctor phrase this statement in a presumptive manner, as illustrated by the Opel study discussed above. If the parent resists, the physician would make it clear that vaccination is the standard and that the parent must schedule a consultation appointment if they wish to forgo vaccination. The details of this consultation appointment are discussed in section IV(B)(3) below.

Making vaccination the default is also advantageous because it reverses the effect of the omission bias.<sup>125</sup> The way the system is currently designed—essentially an opt-in system—the action is deciding to vaccinate your child. On the other hand, in an opt-out system, the action is deciding to forgo the default and decline to vaccinate your child. The omission bias presumably will make parents in this type of system pay more attention to potential negative consequences that could result from opting out. Thus, such a policy would facilitate and incite thoughtful vaccine decision making by parents.

This opt-out system also has the added benefit of portraying childhood vaccination as something that is very strongly urged by doctors. Individuals may perceive an opt-in system as a soft recommendation and will be less hesitant to delay the appointment or not have it altogether. Research has shown the importance of a strong recommendation from doctors.<sup>126</sup> The

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training-doctors-to-talk-about-vaccines-fails-to-sway-parents [http://perma.cc/7GH4-PYGA] (highlighting that doctors are in need of new approaches to vaccine consultation); Maggie Fox, *Doctors to Vaccine Doubters: Get Your Kids Vaccinated*, NBC NEWS (Feb. 9, 2015, 4:01 PM), <http://www.nbcnews.com/storyline/measles-outbreak/doctors-vaccine-doubters-get-your-kids-vaccinated-n303126> [http://perma.cc/2JYE-EZEG] (reporting that Baltimore-area doctors publicly urged holdout parents to get their kids vaccinated); Charlene Laino, *Survey: Younger Doctors More Skeptical of Vaccines but Study Shows Doctors Overall are Supportive of Vaccines for Children*, WEBMD (Oct. 21, 2011), <http://www.webmd.com/children/vaccines/news/20111021/survey-younger-doctors-more-skeptical-of-vaccines> [http://perma.cc/4VSB-BR5J] (reporting that overall support for childhood vaccination among doctors remains high).

124. *2015 Recommended Immunizations for Children from Birth Through 6 Years Old*, CENTERS FOR DISEASE CONTROL & PREVENTION, <http://www.cdc.gov/vaccines/parents/downloads/parent-ver-sch-0-6yrs.pdf> [http://perma.cc/R5E2-4KSJ].

125. See *supra* subpart III(E).

126. See Reinhard Angelmar & Pierre A. Morgon, *Vaccine Marketing*, in *INNOVATION AND MARKETING IN THE PHARMACEUTICAL INDUSTRY* 365, 409 (Min Ding et al. eds., 2014) (“[H]ealth care professionals are the most important information source for vaccination decisions . . .”).

decision to decline vaccination would have to be conveyed to the doctor by the parent, opening the door to a conversation about the parents' concerns and enabling physicians to provide science-based information to address those concerns. A parent and healthcare provider dialogue that is respectful and acknowledges that available information about immunization is confusing "not only can build trust but also has the potential to change immunization beliefs and behavior."<sup>127</sup>

2. *Increasing Transaction Costs to Opt Out.*—Although research suggests that a default option alone will be sticky, the stickiness can be amplified by increasing transaction costs to opt out. Many states require applications for personal-belief exemptions to be notarized, and the exemptions are often only valid for a finite period of time. Presumably, the extra step of notarization and having to refile an application every number of years causes some parents—at least those on the margins—to forgo the exemption, and consequently decreases the total number of exemptions. A number of states have recently experimented with increasing transaction costs to nonmedical exemptions, and there is some evidence showing that this approach can work to increase immunization rates.<sup>128</sup> Oregon now requires parents who wish to obtain a nonmedical exemption for their child to provide a physician's signature verifying discussion about vaccine risks and benefits or to watch an online video about the risks and benefits.<sup>129</sup> On January 1, 2014, a law went into effect in California—a state that has been criticized for making it too easy for parents to avoid immunizing their children—that made it more difficult for parents to obtain a personal-belief exemption for their children.<sup>130</sup> Specifically, the law required parents to submit a form with a healthcare provider's signature verifying that they had been counseled on the risks of rejecting vaccinations.<sup>131</sup> The year the new

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127. Marcuse, *supra* note 110, at 1094.

128. See Louis R. Caplan, *Vaccination Policies and Rates of Exemption from Immunization, 2005–2011*, 367 NEW ENG. J. MED. 1170, 1171 (2012) (noting that “nonmedical exemptions in states with easy exemption policies were 2.31 times as high as rates in states with difficult exemption policies”).

129. See *supra* note 48 and accompanying text. Note, a law that would require both would be even more successful in increasing the effect of the status quo bias. It would also protect against anti-vaccine doctors who, although rare, do exist.

130. *Frequently Asked Questions*, SHOTS FOR SCHOOL, <http://www.shotsforschool.org/laws/faqspe/> [http://perma.cc/D4PM-B5R5].

131. *Id.*

law was enacted, the number of parents requesting personal-belief exemptions dropped “for the first time in a dozen years.”<sup>132</sup>

States could go one step further and impose an extra layer of transaction costs by requiring doctors to schedule consultation appointments for those parents who resist the vaccination default. This would cost the parents both time and money, since there presumably would be a co-pay for the extra appointment.<sup>133</sup> The consultation meeting is ideal because it is a transaction cost that is substantively meaningful and not just a “nuisance barrier.”<sup>134</sup> While a notarization requirement can certainly increase default stickiness, a mandatory meeting with a healthcare provider will likely be even more effective at reducing exemption rates. Such a required meeting will accomplish two things: it will make it more time-consuming and costly to opt out of vaccination, and it will provide parents with accurate information from a trustworthy source so that they can make a thoughtful decision. Nuisance barriers, on the other hand, only accomplish the former. Presumably, some parents may change their mind after a consultation meeting, whereas a notary appointment is unlikely to cause a parent to have a change of heart.

Increased transaction costs will also help deal with those parents who request exemptions out of convenience. It turns out that many personal-belief exemptions are actually “exemptions of convenience”—that is, some parents apply for them simply because it is easier than fulfilling the vaccination requirements. Alarming, in a recent study, “26.1% of respondents stated they submitted a personal[-belief] exemption for convenience purposes so their child could enroll in school.”<sup>135</sup> As long as it is easier to obtain an exemption than it is to meet the vaccination requirements, this illegitimate use of the exemptions will persist. Increasing transaction costs of opting out, however, will effectively eliminate this incentive for parents. The fact that states with more rigorous exemption procedures have lower rates of exemptions<sup>136</sup> illustrates either that exemptions of convenience are pervasive or that vaccine hesitancy is easily overridden.

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132. Rosanna Xia et al., *Fewer California Parents Refuse to Vaccinate Children*, L.A. TIMES (Jan. 23, 2015, 9:32 AM), <http://www.latimes.com/local/california/la-me-immunization-data-20150123-story.html> [<http://perma.cc/U9KL-6C6P>].

133. Again, this regulation would likely not face significant opposition. Doctors would be compensated for the extra appointments. Further, the vast majority of healthcare providers will probably support the regulation’s goal of increasing child-vaccination rates. On the other hand, the regulation would maintain parents’ freedom of choice and thus would not garner significant opposition from anti-vaccine activists.

134. A nuisance barrier is a deterrent that “does not foster informed decision making, and is likely to be viewed as disrespectful by parents hesitant to administer a recommended vaccine to their child.” Marcuse, *supra* note 110, at 1093.

135. Karlen E. Luthy et al., *Reasons Parents Exempt Children from Receiving Immunizations*, 28 J. SCH. NURSING 153, 157 (2012).

136. Caplan, *supra* note 128, at 1171.

Admittedly, this approach—one that requires a physician consultation appointment in order to forgo vaccination—starts to move into “shove” territory.<sup>137</sup> But the somewhat heavy burden placed on parents who wish to opt out is justified by the fact that the vaccination decision affects third parties.<sup>138</sup> Decisions that create risks to third parties warrant the stronger shove over the weaker nudge. Further, in a decisional context that is so deeply riddled with the potential for cognitive bias and risk-judgment errors, a nudge will likely not prove sufficiently effective, making a shove the only feasible option if we want to see results. Sunstein himself has stated that he supports the use of shoves instead of nudges in vaccine regulation.<sup>139</sup> At the end of the day, individuals with strong preferences (i.e., the adamant anti-vaxxers) will still have the ability to opt out, while vaccine-hesitant parents and parents who seek exemptions out of convenience will get the more forceful shove they need.

*3. Information Framing to Implement at Consultation Appointment.*— Under the approach advocated by this Note, doctors will be required to schedule consultation meetings with parents who refuse to vaccinate their child. These required consultations will provide doctors with an additional arena in which they can nudge parents towards vaccination. Family physicians play a central role in shaping parents’ attitudes about vaccines: “[H]ealth care professionals are the most important information source for vaccination decisions . . . [and] they are the key communication channel for delivering messages that change the benefit–risk balance, manage consumers’ pre-decisional emotions, and persuade them to vaccinate.”<sup>140</sup> Accordingly, it is essential that doctors understand the cognitive forces that are at play when a parent is weighing the pros and cons of immunization.<sup>141</sup> With such understanding, they will be able to better design disclosures to

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137. See *supra* note 105 (explaining Sunstein’s distinction between “nudge” regulation and “shove” regulation).

138. See *supra* notes 11–12 and accompanying text. For a discussion on the distinction between self-regarding and other-regarding actions, and an argument advocating government intervention with the latter when there is potential for harm, see John Stuart Mill, ON LIBERTY 149 (Gertrude Himmelfarb ed., Penguin Books 1982) (“Whenever, in short, there is a definite damage, or a definite risk of damage, either to an individual or to the public, the case is taken out of the province of liberty, and placed in that of morality or law.”).

139. See *supra* note 105 (discussing Sunstein’s belief that shoves are justifiable when they might put the health of third parties or children at risk).

140. Angelmar & Morgon, *supra* note 126, at 409.

141. See *supra* Part III.

combat biases that prevent rational risk assessment and to capitalize on biases that make parents more likely to vaccinate their children.

In terms of simple information disclosures, our current approach is simply not doing enough work.<sup>142</sup> Most doctors urge their patients to vaccinate their children, and for the majority of parents, this physician suggestion is enough. But attempting to convince vaccine-hesitant parents that the benefits of vaccinations outweigh any potential harms is a different story. Merely providing these parents with data and information is futile; in fact, it can even backfire and strengthen the parents' anti-vaccination attitude.<sup>143</sup> A recent study discovered that while corrective information successfully corrected misperceptions about the MMR vaccine causing autism, it also reduced intent to vaccinate among vaccine-hesitant parents.<sup>144</sup> Knowing this, physicians need to be very careful about the way they frame the information provided to parents at the required consultation appointments.

There are a variety of ways to frame information to manipulate the recipient's assessment of risk. For instance, research has found that individuals perceive a risk differently depending on whether it is presented as a frequency or a percentage: specifically, "communicating information about the likelihood of a patient harming someone else led to a higher perception of risk under a frequency format than under a probability format."<sup>145</sup> In a study in which experienced forensic psychiatrists were asked to judge the likelihood that a mental patient would commit an act of violence six months after being discharged from the hospital, clinicians who were given an expert's assessment of the patient's risk of violence framed in terms of relative frequency (e.g., "of every 100 patients similar to Mr. Jones, 10 are estimated to commit an act of violence") assessed Mr. Jones as more dangerous than those clinicians who were given an equivalent risk expressed as a probability (e.g., "patients similar to Mr. Jones are estimated to have a 10% chance of committing an act of violence").<sup>146</sup> Further, when clinicians were told that "20 out of every 100" patients similar to Mr. Jones are estimated to commit an act of violence, 40.6% would refuse to discharge the patient; however, when other clinicians were told that patients similar to Mr. Jones are estimated to have a 20% chance of committing an act of

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142. Angelmar & Morgon, *supra* note 126, at 410 ("The traditional strategy of fighting anti-vaccination information with education and evidence-based communication is considered to have been ineffective.").

143. Brendan Nyhan et al., *Effective Messages in Vaccine Promotion: A Randomized Trial*, 133 PEDIATRICS e835, e840 (2014).

144. *Id.*

145. Paul Slovic et al., *Violence Risk Assessment and Risk Communication: The Effects of Using Actual Cases, Providing Instruction, and Employing Probability Versus Frequency Formats*, 24 LAW & HUM. BEHAV. 271, 289 (2000).

146. *Id.* at 288.



violence, only 21.3% refused to discharge the patient.<sup>147</sup> A similar study disturbingly found that individuals rated a disease that kills 1,286 people out of every 10,000 as more dangerous than one that kills 24.14% of the population.<sup>148</sup> Follow-up studies established that these differences in risk perception occur because frequency formats tend to “produce affect-laden imagery.”<sup>149</sup> These results suggest that physicians should present the risks associated with forgoing vaccination—i.e., the risk of contracting the disease—as a frequency. On the other hand, risks associated with vaccinating—such as potential adverse reactions—should be conveyed as percentages, since research shows that those are less likely to conjure up emotional images.

Additionally, healthcare providers should seek to reduce the impact of betrayal aversion on a parent’s vaccination decision. Research shows that “factors that dampen a decision maker’s negative emotions can reduce betrayal aversion.”<sup>150</sup> Building upon a probability-assessment study that found that participants were less likely to collect necessary data and more likely to jump to conclusions following exposure to anxiety-producing stimuli, Gershoff and Koehler hypothesized that “exposure to positive stimuli [might] reduce the negative emotions associated with betrayal risk and [thus] weaken the betrayal aversion effect.”<sup>151</sup> In their study, participants were given the choice between two cars with the same features as Car A (2% risk) and Car B (1% risk + .01% betrayal risk) in the Gershoff and Koehler betrayal aversion study discussed in subpart III(D).<sup>152</sup> The description of the cars was presented to participants as an excerpt from a consumer magazine article.<sup>153</sup> At the bottom of the page was “[a]n ad for a photo contest that would appear in the next issue of the magazine.”<sup>154</sup> For one group of participants, the ad contained positive images (such as a child eating watermelon, a family in a living room, and a butterfly on a flower); for the other group, the ad contained negative images (such as a dog baring its teeth and a tornado).<sup>155</sup> The hypothesis proved correct: the positive images “decreased negative emotion and decreased aversion to the low risk safety option that had a potential to betray.”<sup>156</sup> This indicates that physicians might be able to lessen the effect

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147. *Id.*

148. Kimihiko Yamagishi, *When a 12.86% Mortality is More Dangerous than 24.14%: Implications for Risk Communication*, 11 *APPLIED COGNITIVE PSYCHOL.* 495, 500 (1997).

149. Paul Slovic et al., *supra* note 77, at 317.

150. Andrew D. Gershoff & Jonathan J. Koehler, *Safety First? The Role of Emotion in Safety Product Betrayal Aversion*, 38 *J. CONSUMER RES.* 140, 146 (2011).

151. *Id.* at 144.

152. *See supra* note 87 and accompanying text.

153. Gershoff & Koehler, *supra* note 150, at 144.

154. *Id.*

155. *Id.*

156. *Id.* at 145.

of betrayal aversion on the vaccination decision by including positive images in the informational pamphlets and brochures that they provide to parents at the consultation appointment.

Yet another study conducted by Gershoff and Koehler found that negative emotions were dampened and the effect of betrayal aversion reduced when statistical information associated with a betrayal risk was presented in a graphical format.<sup>157</sup> “Participants in the visual risk presentation conditions received an image graphic that described the number of deaths expected out of 10,000” for the airbags in Car A and Car B, respectively.<sup>158</sup>

There was a box above the description of each air bag titled “Total deaths expected in 10,000 serious accidents”[; t]he option associated with the 2% risk showed an array of 200 tiny icons of skulls and crossbones[, while] the option associated with the 1.01% risk contained 101 . . . skull and crossbones icons.<sup>159</sup>

While betrayal aversion still occurred with the visual risk representation, it occurred less frequently than it did when the risk was presented solely in narrative form.<sup>160</sup> Healthcare providers might use a similar technique to illustrate the risks associated with not vaccinating compared to the risks associated with vaccinating. Additionally, regulations might require doctors to provide parents with similar graphics depicting vaccination rates at local schools if those rates fall below threshold herd-immunity levels.

Finally, research suggests that “refutational texts” which “provid[e] clear-cut evidence and explain[] the motivation behind the initial spread[] of misinformation (i.e., a ‘this is the myth; this is why the myth has spread; this is the truth; this is the evidence’ approach)” tend to be significantly more effective than simple retractions which simply state that some piece of information is not true.<sup>161</sup> In fact, a 1993 study found refutational texts to be the most effective misinformation correction strategy.<sup>162</sup> Thus, instead of just denying the link between vaccines and autism, an information pamphlet might provide a comprehensive explanation of why the misconception exists in the first place. More specifically, parents might be more affected by a pamphlet refuting the link between vaccines and autism if it disclosed the facts that Andrew Wakefield “received around half a million pounds in undisclosed payments from a lawyer preparing a class action against” a producer of the MMR vaccine “and that there were plans to start a company

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157. *Id.* at 146.

158. *Id.* at 145.

159. *Id.* at 145–46.

160. *Id.* at 146.

161. Ullrich K. H. Ecker et al., *Correcting Misinformation—A Challenge for Education and Cognitive Science*, in *PROCESSING INACCURATE INFORMATION: THEORETICAL AND APPLIED PERSPECTIVES FROM COGNITIVE SCIENCE AND THE EDUCATIONAL SCIENCES* 13, 29–30 (David N. Rapp & Jason L. G. Braasch eds., 2014).

162. *Id.* at 27–28.

to sell diagnostic tests.”<sup>163</sup> Similarly, physicians might use refutational texts to inform patients about the ways individuals and organizations profit from the anti-vaccine sentiment and to educate parents on the biases that have allowed the sentiment to flourish.

While none of these strategies is likely to be sufficient alone, they could have a good chance of being effective if employed simultaneously and in concert with the framing of child immunization as the default and increasing costs for parents to opt out. At the very least, these strategies provide good starting points for policymakers and healthcare providers who wish to find ways to nudge parents towards immunization.

*4. Potential Opposition.*—As with any new regulation addressing a contentious issue, there will likely be some pushback to the proposals advocated in this Note. The opposition will probably fall under one of two categories. First, libertarians will argue that the policy suggestions outlined herein—particularly the one requiring parents who wish to opt out of vaccination to schedule a consultation appointment—do not actually preserve freedom of choice. Specifically, it could be argued that the consultation appointment will be so burdensome on the vaccine-hesitant parent that it will effectively make the choice for them. But the consultation appointment does not remove parental choice completely—it simply creates a barrier so as to encourage parents to choose vaccination. Further, the entire premise of libertarian paternalism is that freedom of choice is preserved for those with the strongest preferences while individuals with weak preferences are pushed in welfare-maximizing directions. The fact that some parents would be so easily swayed by this additional hurdle—the fact that their vaccine hesitancy could be so easily overridden—illustrates that their risk judgments were likely shaped and impacted by the various biases discussed in Part III.

Second, some healthcare professionals and scholars might argue that the nudging/shoving approach advocated here does not go far enough. This argument is more persuasive than the latter—there is evidence that strict mandates are associated with higher vaccination rates.<sup>164</sup> However, as discussed in subpart IV(A), the paternalistic approach is probably untenable. That is, policies that seek to eliminate personal-belief exemptions will face severe political opposition from anti-vaccine activists. Even if such policies are able to garner enough support to pass through state legislatures, they will unquestionably be challenged in the courts. For example, California’s recent legislation eliminating religious and philosophical exemptions is already being confronted with legal challenges.<sup>165</sup> The issue of declining childhood-

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163. *Id.* at 27.

164. *See supra* note 107 and accompanying text.

165. *See* Mello et al., *supra* note 53, at 786 (noting that opponents of the bill have threatened to challenge it on constitutional grounds).

immunization rates needs to be addressed now. We cannot afford the time that these various roadblocks would entail. A libertarian paternalistic approach is one that can be implemented relatively quickly and has a bigger chance of long-term success.

## V. Conclusion

Declining childhood-vaccination rates present a serious problem for contemporary American society. When millions of children around the world lack access to disease-preventing vaccines that have the potential of saving thousands of lives, it seems counterintuitive that Americans who do have access to such vaccines are voluntarily forgoing them. But this issue is not a matter of right or wrong. Whether we like it or not, cognitive biases pervasively affect our risk judgments. However, when we cultivate a deeper understanding of these biases, we can concurrently combat the ones that prevent rational risk assessment and exploit the ones that push us in welfare-maximizing directions. An outright elimination of all personal-belief exemptions would certainly accomplish the former; it is an approach that attempts to prevent these biases from influencing choice in the first place. But an approach that nudges—and even shoves—individuals while also maintaining autonomy of choice is more appealing from a policy standpoint, is more likely to earn support from state legislatures, and is less vulnerable to future constitutional challenges.

—*Marysia Laskowski*