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Sick With Fear: Popular Challenges to Scientific Authority in the Vaccine Controversies of the 21st Century

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By Ellen Watkins

Abstract

In the 20th century, vaccines were heralded as one of the greatest medical inventions in history. In the late 1990's, however, the myth of vaccine-caused autism caught fire. Despite mountains of evidence disproving the link, panicking Americans eschewed vaccines and turned against their physicians. Why did Americans turn their backs on doctors, scientists, and the health industry? This paper follows the vaccine controversy of the last thirty years, looking in particular at the relationship between science and the media. This paper analyzes the contrast between discussion of the hypothesized link in scientific circles and in popular news sources, seeking to understand how average Americans learn about scientific discoveries and why, in the case of vaccines, fear mongering celebrities and journalists were more persuasive than scientists and doctors. This study shows how the mystery of autism, American resentment of the elite, and mistrust of the government empowered the sensationalist anti-vaccine movement and sparked a fear of vaccines that went against all science and reason.

In 2008, a seven-year-old boy in San Diego contracted measles during a family trip to Europe. In the two weeks before his symptoms began to show, he unintentionally exposed over eight hundred people to the measles. Eleven children and babies were infected, and over 70 other children were put in quarantine.[1] The cost of the outbreak response that followed was enormous; an estimated $177,000 of public and private funds were spent containing the disease, paying for medical costs, and funding state and county personnel involved in the fiasco.[2] It was the first incidence of a measles outbreak in San Diego in almost twenty years.[3]

Prior to 1963, about 50,000 children were hospitalized every year for measles, and as many as 500 died annually from the disease. Since the introduction of a measles vaccine, however, incidence of the measles in the United States has fallen a whopping 99%. The vaccine is extremely effective: 99.7% of children who receive the full schedule of measles-mumps-rubella vaccine (MMR) have lifelong immunity from the measles.[4] Furthermore, the vaccine is widely available and affordable. Most private health insurance plans cover payment for the MMR vaccine, and the Center for Disease Control's (CDC) Vaccines For Children program guarantees free vaccinations for children under 18 who are uninsured or whose health insurance does not cover MMR.[5]

Why, then, did the measles spread through San Diego in 2008? Why were the lives of families disrupted, more than 70 children taken out of school, and several children and infants hospitalized with wildly high fevers? The key detail in this story is that the child who initially contracted the measles, and several of his classmates who also fell ill, was intentionally unvaccinated.

In the United States, opting out of vaccination has become increasingly popular. Most states in the US require parents to show proof of immunization when enrolling their child in school. However, parents can obtain exemption from vaccination for medical reasons (child has allergic reaction to vaccines, etc), religious reasons, or, in 15 states, "philosophical reasons."[6] In the school the index patient attended, a whopping 11% of students were unvaccinated by choice.[7]

This trend is symptomatic of a larger anti-vaccination movement that has been gaining steam in the United States over the last thirty years. This paper will look at the history of the backlash against vaccines from the late 1980's up to 2011. Looking at popular news sources and scientific journals, I will focus on the discourse in popular media and the scientific community about vaccine safety, and the discrepancy between what is published in scientific circles and what is reported in the news to the majority of Americans. I hope to address questions like why did the myth of a vaccine-autism link survive for years after it was debunked, why was scientific data showing the safety of vaccines doubted but the intuition of mothers accepted as proof of danger, and what does this reveal about American attitudes towards science and authority?

It should be noted that the history of vaccines and vaccine opposition dates back to the inception of vaccines. Reverend Edmund Massey preached against "the Dangerous and Sinful Practice of Inoculation" as early as 1722, and movements such as the Anti-Vaccination Society of America in the 1880's were powerful in sending an anti-immunization message. However, the full history of immunization controversy is beyond the scope of this paper. In focusing on the last thirty years, I

hope to give a detailed, well-examined study of the contemporary anti-vaccination movement.

The Beginning

Between 1989 and 1991, the United States suffered the largest measles epidemic in over a decade. Between 1980 and 1988, an average of 3,000 measles cases were reported annually; in 1989, over 18,000 cases were reported and almost 28,000 were reported the following year. During those two years, an estimated 130 people died from measles-related causes. The epidemic hit major cities, including Houston, Los Angeles, Philadelphia, and New York, with the majority of infections occurring among African American and Hispanic children. In the cases reported, 81% occurred in children who were not vaccinated, up from 54% in the years preceding the outbreak.[8]

The epidemic brought attention to the low vaccination rates in the United States and stimulated a renewed immunization effort. In 1993, President Clinton launched the Childhood Immunization Initiative, which established the Vaccines for Children program, guaranteeing vaccines for all children regardless of health care coverage.[9] In the same year, the CDC began giving planning grants to establish immunization registries in every state. Immunization registries, confidential computerized databases that track children's immunization records, would allow an area to measure immunization levels, ensure children are up to date on their vaccines, and improve vaccination programs. Millions of private and public funds, including a

$20 million grant from the Robert Wood Johnson Foundation, were spent establishing registries in all 50 states, several large cities, and US territories.[10]

Suspicion of vaccination, however, was growing in the American conscious. In 1982, Barbara Loe Fisher founded the National Vaccine Information Center (NVIC) with parents who believed their children were harmed by vaccination. The Center was formed under the title Dissatisfied Parents Together, but changed its name in the 1990's a few years after the formation of the National Vaccine Advisory Committee (NVAC), a government organization that reviews vaccine safety and effectiveness.[11] The largest vaccination watchdog group in America, the NVIC became a powerful source of immunization-related fear mongering. Its publications promote doubt of vaccine research and the government, publicly stating "every vaccine carries a risk of injury or death," and providing a wealth of resources on the dangerous side effects of routine immunizations.[12] In 1985, Fisher published *DPT: A Shot In The Dark*, which sparked panic about the safety of the widely used diptheria-pertussis-tetanus vaccine (DPT) and America's vaccination system.

The national push for immunization in the early 1990's increased public suspicion about vaccines. The number of vaccinations recommended for infants sharply increased in the early 1990s, from seven vaccines to eleven, administered in as many as 20 separate shots.[13] This increase sparked the fear that too many doses of vaccines given simultaneously would "overwhelm" a child's immune system. The "pincushion effect," fear that many shots during the same pediatrician visit would be harmful, led to an increase in skipped or postponed vaccines among parents.[14]

Ironically, the success of immunizations also began to work against the

popularity of vaccines. Measles incidence dropped from approximately 500,000 cases per year pre-vaccine to less than 2,000 in 1983. Incidence of mumps decreased 99.57% after the mumps vaccine was licensed. Reported cases of rubella, which can cause mental retardation and death, dropped from approximately 60,000 the year its vaccine was licensed to less than 500 cases in 1992.[15] While these statistics show positive results, less disease incidence led to less fear of disease. In the 1990's, Americans rarely saw children paralyzed by polio or killed by the measles, and therefore they felt no threat of sickness and no urgency to vaccinate their children. Parents began to see vaccines as dangerous because the threat of contracting a disease through injection was greater than the threat of contracting a disease in its wild form. Out of fear, increasing numbers of parents abstained from immunizations. The irony of this, of course, is unvaccinated children are exponentially more likely to contract these dangerous and preventable diseases.

The surge in government efforts, the increase in the vaccine schedule, and the lack of fear surrounding vaccine-preventable diseases fueled apprehension towards infant immunization. In the late '90's, the movement would gain two footholds that immeasurably increased fear of immunization and propelled the movement into the next century.

Dangerous Press

In February 1998, Andrew Wakefield and 12 scientists released a report in the British journal *The Lancet* that showed evidence of a causal relationship between the

MMR vaccine and autism in children. The media in the United Kingdom gave great attention to the study, and, in the months following the report, to anecdotal horror stories about children who purportedly developed autism from MMR vaccination. Panic spread and immunization rates for MMR declined drastically in the UK, from 80% of children to only 30%.[16]

The following year, fear of vaccine-induced autism overwhelmed the United States. For over 70 years, vaccine vials contained thimerosal, a preservative that is about 50% ethylmercury. It was used to prevent contamination. When the Food and Drug Administration Modernization Act of 1997 called for a review of mercury compounds in drugs and food, the FDA found that the concentration of thimerosal in the vaccination schedule might expose some children to higher-than-recommended levels of mercury. Despite that these standards were based on the dangers of the much more harmful and resilient compound, methylmercury, the FDA recommended that thimerosal be removed from all vaccines.[17] Fear that thimerosal was dangerous caused a sharp decline in infant vaccinations in America; hepatitis B immunization, usually administered within 12 hours of birth, dropped from 84% to 43% in Wisconsin and as low as 28% in Oregon. In Michigan, an infant who did not receive vaccination at the recommended time died of hepatitis B at three months.[18]

The release of *The Lancet* study and the changed FDA guidelines gave incredible strength to the anti-vaccination movement in America. The FDA concern validated mothers' panic and the Wakefield study fortified their argument against immunization. The combination of what appeared to be federal admission of danger

and scientific proof gave the anti-vaccine movement credibility. The scientific community would devote enormous resources to eradicating the myths of vaccine danger in the coming years.

Scientific Response

As early as 1999, the American Academy of Pediatrics and the Public Health Service published a joint statement on the safety of thimerosal in vaccines, stating "there are no data or evidence of any harm caused by the level of exposure that some children may have encountered in following the existing immunization schedule."[19] In the years following the FDA report, a multitude of reports and studies would echo this conclusion. As early as 2001, a report in *Pediatrics*, the official journal of the American Academy of Pediatrics, published a review concluding, "[the] review revealed no evidence of harm caused by doses of thimerosal in vaccines."[20] A 2003 study in Denmark and Sweden (where thimerosal use was discontinued in 1992) showed autism rates continued to rise despite that children were no longer exposed to the compound, contradicting the hypothesis of a causal relationship between thimerosal and autism.[21] In Quebec, where thimerosal use was terminated in 1996, a study of students between 2003-2004 reported similar findings, noting that prevalence of developmental disorders were actually higher among children who were not exposed to thimerosal.[22]

When the FDA called for a decrease in thimerosal use to prevent exposure to potentially dangerous levels of mercury, the parameters of how much was considered

"too much" were based on methylmercury, the compound found in fish. Studies specifically on ethylmercury (the mercury compound found in thimerosal) in the early 2000's began to reveal that the mercury compound in thimerosal has a considerably less harmful impact on the human body. Studies published in 2002 and 2003 found that the mercury in thimerosal stays in the bloodstream for less than half as long as methylmercury, has a half life of only seven days, and clears from infants' bodies even faster than from the bodies of adults.[23,24] These studies further disproved the dangers of thimerosal.

The hypothesis of a link between MMR and autism in children was also under siege in the scientific community. Only two years after Wakefield's paper was published, a 14-year Finnish study reported to have found no danger of the MMR vaccine.[25] The British Medical Research Council published an immense 91-page review of autism research in 2001, concluding that "[c]urrently there are no epidemiological studies that provide reliable evidence to support the hypothesis that there might be an association between MMR and ASDs."[26] By the mid 2000's, several other studies published failed to find a connection between the vaccine and autism incidence.[27,28]

In 2004, Wakefield's paper took two devastating blows to its credibility. In March, ten of the twelve co-authors of the original catalytic paper printed a retraction in *The Lancet*. In the face of overwhelming evidence, the scientists withdrew the conclusions made in the 1998 report, stating, "We wish to make it clear that in this paper no causal link was established between MMR vaccine and autism as the data were insufficient… we consider now is the appropriate time that we should together

formally retract the interpretation placed upon these findings in the paper."[29] In the same month, the *Sunday Times* published documents that showed that Wakefield's findings were "entirely flawed." The documents also revealed that Wakefield "failed to declare his financial and conflicts of interest" in 1998, raising questions about his motives behind his research. Further, they called into question whether the children in the study were treated ethically and safely, further damaging the validity of its findings.[30] The news echoed through the scientific community, and the editors of *The Lancet* released a statement expressing their regrets about the catastrophe.[31]

By 2004, the twin scourges of a thimerosal-autism link and an MMR-autism link were both thoroughly discredited in the scientific community. The Institute of Medicine issued its final report on thimerosal safety in 2004, rejecting a causal relationship between the compound and autism in children.[32] Wakefield's hypothesis, too, was poked full of holes by colleagues and discovery of misconduct. In the popular media, however, the myth of vaccine danger was just reaching the presses.

Reaching the Public

The theory of a link between vaccines and autism crept slowly into the American conscious. In 1999, *Newsweek* raised awareness of possible danger by publishing an article on the safety of immunizations, citing views from anti-vaccine activists and forwarding readers to the NVIC further information.[33] In 2000, the popular news and entertainment site Salon.com posted a fear-inspiring story of a

mother who believed her son developed autism because of his routine immunizations.[34] In the same year, Senator Dan Burton (Rep, Indiana) began a crusade against vaccines after his grandson was diagnosed with autism. In impassioned congressional hearings, he questioned the validity of data regarding thimerosal and accused scientists in the IOM of accepting bribes.[35]

These incidences alone did not create a national panic. They did, however, spark curiosity about the anti-vaccination undercurrent. When Americans turned to web to learn more about the hypothesized epidemic, they were bombarded by a wealth of anti-vaccine propaganda. Unlike published journals or the advice of experts, the Internet is unreliable: anyone can post anything online, regardless of accuracy or truth. Official-looking websites like *LoveYourBaby.com* and *ThinkTwice.com* (home of the "Global Vaccine Institute") offer unchecked and wildly biased anti-vaccination literature to curious parents. The inflammatory, frightening articles that litter the Internet proved the reality of the vaccine-autism epidemic to many and spread concern among average Americans.

In 2005, the anti-vaccination movement gained widespread attention. In June 2005, *Rolling Stone* and *Salon.com* jointly published "Deadly Immunity" by Robert F. Kennedy Jr. The article claimed "government health agencies colluded with Big Pharma to hide the risks of thimerosal from the public" and accused federal agencies of "institutional arrogance, power and greed."[36] The Kennedy article belittled experts, questioned the government, and stoked fires of mistrust among already suspicious Americans. Interestingly, the article was published the year *after* Wakefield was discredited and the IOM published their final report on the safety of

thimerosal. (In the months after its release, *Rolling Stone* would publish corrections of the article in three separate issues and *Salon.com* would make five separate corrections posts to acknowledge inaccuracies in the essay.)

In the same year, journalist Robert Kirby also published an account of the thimerosal and MMR controversies. His book was heralded as clear and unbiased and received a starred review from Publishers Weekly.[37] The book chronicled the story of the "Mercury Moms," telling the heart-wrenching tales of families whose children were allegedly stricken with autism because of vaccinations. Despite that it was published in 2005, after conclusive scientific evidence disproved the viability of such a diagnosis, the book enjoyed widespread success.

What is bewildering about this is that journalists and politicians authored the most influential publications about the vaccination controversy in the early 2000's. Though the issue is inherently scientific, based on the neurochemistry of infants and the interaction of vaccine formulas and body chemistry, the articles that received the most public attention had only vague ties to the science behind immunization. Kirby's book, recommended as "the book for parents to read" by Publishers Weekly, is a journalistic account of anecdotal stories. Senator Burton's congressional hearings on thimerosal cling not to data but to the faint acknowledgement of uncertainty in thimerosal studies common to all scientific research.

The media is how most Americans learn about scientific discoveries, however, and by the mid 2000's news coverage of the controversy had stoked fear of vaccination that was greater than ever.

The Dangers of Misinformation

As the FDA recommended, the compound thimerosal was removed from all vaccines but some doses of the influenza vaccine by 2001. Children were no longer exposed to high levels of ethylmercury and the supposed "threat" was eliminated. The fear of thimerosal, however, was far from extinguished.

Robert F. Kennedy Jr.'s essay renewed passion for the thimerosal controversy. Despite its many errors, it reached a wide audience and caught attention. *Evidence of Harm*, too, sparked fear in new parents. Both of these works fed suspicions about honesty in the government; lobbies like the NVIC and SAFEMINDS (Sensible Action for Ending Mercury-Induced Neurological Disorders) reveled in this sentiment, publishing press releases that questioned government honesty and accused the government of irresponsible, malicious behavior.[38]

Kennedy continued to stoke fires when he guest wrote two articles on the popular news blog *The Huffington Post* in 2006. Addressing the influenza vaccine shortage, he reinforced bias against thimerosal, describing it as "known brain poison" and describing thimerosal-free vaccines as "child-safe."[39] In 2007, Jenny McCarthy published *Louder than Words: A Mother's Journey in Healing Autism*, in which she asserted that her son's autism was caused by the vaccines he received as an infant. The television network ABC particularly exacerbated public fear when it aired the pilot episode of the drama *Eli Stone*. The episode followed a storyline in which the mother of an autistic child wins millions of dollars in damages from a vaccine maker because their mercury-based vaccine caused her child's disorder.[40] The episode

confirmed the reality of vaccine-caused autism for many and was widely criticized by the AAP, CDC, and other organizations.

The impact of the media coverage and public panic is striking. In 2003, the CDC estimated full immunization among children 19-35 months to be as high as 94%. In 2008, the CDC's survey showed that national coverage had dropped to only 76.1%.[41,42] A survey conducted by the Florida Institute of Technology in 2008 showed further alarming results. When asked to respond to the statement *Autism is caused by a preservative once found in childhood vaccines*, 19% agreed and 43% were unsure, meaning only 38% believed no link existed. Moreover, when asked about vaccine safety, a full 24% of survey respondents stated that because vaccines may cause autism, it was safer to not vaccinate children at all.[43]

The dangers of this uncertainty are manifold. First, because of the increase in public concern, thimerosal research continued throughout the 2000's. Today, thimerosal is irrelevant to the vaccine discussion; children are exposed to trace amounts of the compound or none at all. ("Trace amounts," meaning 1mg of thimerosal per dose, is found in only 5 of the 30 vaccines approved by the CDC today.)[44] By spending research funds to evaluate the safety of thimerosal, millions of dollars have been diverted from forward-moving autism research.

Vaccine fear and low immunization rates pose dangers beyond the scientific community as well. On an individual level, choosing not to immunize oneself and one's child puts the infant at risk for several life-threatening diseases. As stated before, measles killed an average of 500 children annually before the measles vaccine was licensed. Mumps can cause brain damage and deafness, and today there is still

no treatment for the disease once contracted.[45] In 2005, 31 children died from whooping cough (also known as pertussis) and it is estimated that children who do not receive the DTaP vaccine are 23 times more likely to contract whooping cough.[46]

On a larger scale, a decrease in vaccination rates poses a threat to all of one's community. Many who opt out of vaccinations cite the power of herd immunity to protect their children. The idea behind herd immunity is that in a highly immunized community, if one child gets sick, the disease will probably not spread because it will come in contact only with children who are immune. When more families choose not to immunize their children, however, it is easier for the disease to infect more children and become an outbreak. If many parents choose not to vaccinate their children, the danger is twofold. First, the protection of herd immunity degrades and their children are put at a greater risk. Second, parents who choose not to immunize their children jeopardize the health of kids who cannot be vaccinated. A small percentage of children cannot be vaccinated because they are allergic to vaccine ingredients or have medical complications. By choosing not to vaccinate their children, parents put these children in danger.

How did fear of vaccines spin so out of control? Why did Americans reject the wisdom of scientists and question the government but accept anecdotes and the validity of "mother's intuition?" What does this say about how Americans see authority? The vaccination controversy of the last 30 years raises questions about American attitudes towards science, authority, and individual initiative.

Why Did This Happen?

It is important first to acknowledge the foreboding aspect of vaccines. Vaccines are inherently mysterious. Comprised of complex chemicals well beyond the curriculum of high school chemistry, average Americans may be wary to trust vaccine injections because they do not recognize or understand the components. Adding to the mystery, most resources devoted to explaining how vaccines work are clear but brief, and leave most of the process unexplained. This gives people a basic understanding but leaves the process seeming hazy and vague.

Furthermore, vaccines are inherently violent. "Shots are considered invasive. It's an aggressive act," vaccine advocate Paul Offit has said.[47] Needle phobia is a common fear in America: more than 1 in 5 people reported being afraid of needles and getting shots, according to a 2001 Gallup poll.[48] Injections are hard to accept because they are aggressive and they force many people to interact with what scares them. The line is thin between seeing vaccines as helpful and safe and seeing them as scary, painful, and dangerous. The mysterious nature of vaccines and the fear that surrounds them makes it easy for rumors of danger to catch fire.

In considering this controversy, one must also acknowledge the mystery that shrouds Autism Spectrum Disorders (ASD). ASD is a range of disorders characterized by impaired social and communication skills and repetitive behavior, typically appearing within a child's first three years of life.[49] Development of autism is devastating for parents. One mother described her thoughts as she began to notice her one-year-old son regress socially, writing, "We… desperately wanted him to just act normal … In my prayers I asked for one thing: Please, please let him say "mama"

to me again."[50]

Autism is deeply mysterious. As of today, scientists are not sure what causes it. There is no treatment for it. Even what is defined as "autism" is constantly changing. In the last thirty years, incidence of autism has increased exponentially, from an estimated 1 in 20,000 children in 1980 to 1 in 110 children in 2008.[51,52] Many hypothesize that this spike in diagnosis is the result of its changing definition; the *Diagnostic and Statistical Manual of Mental Disorders* (DSM), the standard for diagnosing mental disorders, revised its definition of autism in 1987 in its third edition and again in 1994 in the fourth edition. (Diagnosis of autism in the United States began to increase significantly in 1988.)[53] However, ASD symptoms usually appear around 18 months, the same time children receive most of their routine immunizations. The correlation between the two events makes many parents believe vaccines *caused* their child's autism. Because so little is known about autism and because vaccines are so foreboding, many find the connection plausible.

When dealing with such elusive issues, who can one trust? Doctors? The government? Friends? What is interesting about the vaccine-autism controversy of the last 30 years is the public's faith in anecdotes and word-of-mouth. Searching for confirmation of their fears, Americans willingly believed the fear mongering of stricken mothers and celebrities, and ignored the mountain of research published in the scientific community. What was it about their stories and statements that were so much more influential than cold, hard science? Why did hearsay prevail?

The answer to this question begins with the narrative of the victim mother. In lieu of science, anti-vaccination activists rely on the stories of innocent, vulnerable

mothers to prove vaccines harm children. "Mothers tell us how they took a happy, healthy, bright, normally developing child to the doctor to be vaccinated and then, within hours, days or weeks, their child regressed physically, mentally and emotionally and became a totally different child," Barbara Loe Fisher said at one IOM conference, "The mother… knows her child in a way no one else does. The mother knows with all of her senses that her child changed."[54] Without the data to prove vaccines cause autism, activists use heart-wrenching stories to strengthen their argument.

Why is this effective? Shouldn't one know to trust science, not stories? The stories of victimized mothers affect people in a way that is not rational. By appealing to the emotions, these anecdotes grab people by the heart and appeal to their sense of empathy. The "mother" is a relatable, lovable figure; Gallup polls show that 87% of Americans feel their mother had a positive influence on them.[55] Stories of mothers hurt and heartbroken are persuasive because we feel sympathetic towards the women affected. By playing up the victimized parent, anti-vaccine advocates win sympathy and support.

The critical aspect of this narrative is that the doctors and the government are the villains, taking advantage of these mothers and damaging their children. In the narrative of her child's autism, Lesli Mitchell describes herself as "frustrated by the lack of sympathy and knowledge in the medical community" and her son as "a cash cow for an industry that tested its products in production rather than the lab."[56] Fisher encourages this schism between mother and doctor, stating, "The mothers…know they have a sacred duty to protect their children's lives and they live

in fear of state officials and even their own pediatricians."[57] These narratives demonize scientists, doctors, and the pharmaceutical industry, turning people against the scientific evidence that disproves the vaccine-autism link.

Americans' willingness to blame doctors and scientists stems from the detachment many feel from the scientific community. This distance is the result of a greater issue: the poor quality of science education in America. American science education is embarrassingly weak: according to the Third International Mathematics and Science Study, American students rank below their counterparts in 17 other countries, and the National Science Teachers Association reported in 2003 that barely a quarter of high school graduates scored high enough on the ACT to succeed in a first-year college science course.[58] In a survey of American adults, only 4% saw science as the most valuable subject in school and until 2007, the No Child Left Behind Act did not even include a science section in its evaluations.[59]

Without satisfactory science education, the scientific community becomes inaccessible and elite. In America, there is a great deal of "othering" of scientists and experts because Americans are not educated enough to feel confident in scientific circles. Americans were willing to turn against the scientific community in the vaccine controversy because there was already distance established between experts and average Americans.

This stigmatization of experts also leads to mistrust of medical professionals. One of the most elite professions, requiring upwards of eight years of extra schooling in exclusive institutions and earning an average salary of $200,000, medical professionals are particularly susceptible to the "othering" effect.[60] A recent essay in

the Journal of American Medical Association explored the different ways physicians are seen by the public, as knights and knaves. The general trend reported that doctors had fallen from grace, from being seen as helpful, benevolent knights to being seen as self-interested, profit-driven knaves. As health care costs have increased (and physicians' salaries have risen), the public has become increasingly less trusting of their doctors.[61]

This mistrust encouraged Americans' wariness of vaccinations. Because people fear physicians are concerned with earning profits instead of their patients' health, they are quick to be suspicious of the increase in the number of vaccines given to children. Many suspect the spike in shots given was simply a moneymaking scheme by doctors and the pharmaceutical industry. This suspicion empowers anti-vaccination activists because it promotes the idea that vaccines are extraneous and unnecessary. When doctors claim immunizations offer much greater benefits than risks, many Americans do not trust them because they doubt whether these physicians are concerned with patients' best interests or their own. This mistrust of doctors enhanced public willingness to doubt and reject immunization.

In addition to suspicion of scientific professionals, suspicion of the government also plays a role in the anti-vaccination movement. Throughout the vaccine controversy in the last thirty years, the government and its organizations have been repeatedly demonized. Robert F. Kennedy Jr. accused the CDC of colluding with pharmaceutical companies and silencing conflicting research.[62] The NVIC, as well, has called the CDC "dangerous and irresponsible."[63] This degradation of the government's organizations weakens public trust and makes one

more suspicious of government-released studies and federal programs. (For example, ten years after the push for federal immunization registries began, only 24% of Americans reported allowing their children to participate.[64])

One of the most powerful aspects of activists' anti-government rhetoric is characterizing immunization as "forced vaccination." Understandably, Americans recoil at the idea of government-mandated action. Freedom is ingrained in our culture, with the declaration of equality and individual initiative penned into the Declaration of Independence. Furthermore, our history is littered with instances of government-mandates that are better left forgotten, such as the Japanese internment in the 1940's and the forced sterilization programs of the 1930's and the 1970's. By describing vaccinations as a "forced" government program, anti-vaccine groups implicate vaccination with government corruption and the loss of individual initiative.

Finally, one must consider the role of reporters in the vaccine debacle. Because the majority of Americans are scientifically illiterate, news outlets are how most people learn about scientific breakthroughs. News outlets, however, do not always bear the duty to report the facts responsibly. Two aspects of scientific news reporting cause trouble in society.

First is the difference between the natures of science and journalism. "Science is like a slow winding stream," Gary Schwitzer, former CNN reporter, has said "It has ebbs and flows, and twists and changes in its path that, if you don't follow, can fool you. But too many reporters, unfortunately, like to dip their toe in the water, run back and report about it without following that river to where it leads."[65] Suspected

autism-vaccine links were big news and reporters jumped on opportunities to tell the stories. The aftermath of this, however, was sudden panic. Reaction to reports of an MMR-autism link in the UK caused a massive decline in immunizations. After the news of changes in thimerosal regulation, infant vaccinations also dove. The problem with this is that scared citizens believed what they read and put themselves in unnecessary danger before solid proof was established. By leaping on exciting stories before all the facts are established, journalists distort facts and cause unneeded panic.

The second flaw in the relationship between science and journalism is the philosophy that there are always two sides to a story. Scientific evidence formed a bounty of evidence against the claim that vaccines cause autism. Regardless, *Rolling Stone* still published Kennedy's article on the "other side" of the controversy in 2005 (an article so flawed that *Salon.com*, who posted it online in tandem with *Rolling Stone*, removed it from their archives in 2011). In cases like the vaccine debate, there is only one side. The stories of mothers' woes and vague suspected corruption are not valid arguments to counter experimental data and research. By representing "both sides," the popular media led the public to think there was room for doubt about the issue.

The special court designated for vaccine-autism cases ruled in 2009 that families it its three test cases did not provide evidence for a link between their children's immunizations and their subsequent autistic developments.[66] In 2010, the General Medical Council revoked Andrew Wakefield's license. The 2-and-a-half-year misconduct trial found him "dishonest," "irresponsible," and to have shown "a

callous disregard" for the well being of the children he studied.[67] Worse, the GMC found that Wakefield had an enormous conflict of interest: £55,000 of funding for his MMR study came from a legal aid board interested in suing vaccine manufacturers.[68] By 2010, it seemed the legislation had finally caught up with what scientists had been claiming for years.

How will this affect the Americans' attitudes towards vaccines? It may change them. Or it may not. One dissenter has said, "The link between autism and MMR has developed the status of a religion: the anti-vaccine lobby simply believe that the link is there, in much the same way that people believe in God. Mere evidence is not going to change that."[69] But there is hope. With publications like *The Panic Virus* by by Seth Mnookin and *Autism's False Prophets* by Paul Offit, along with news support and the growing consensus that there is no connection between vaccines and autism, it looks like a better-informed America is finally ready to accept that immunizations are not to blame.

The issues that surround the vaccine controversy are murky, and the questions of trust the debacle raises are manifold. The story of immunizations in the last thirty years reveals much about American bias and our relationships with science and the government. With the events of late, it will be interesting to see what we learn in the coming decades.

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