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To Vaccinate or Not To Vaccinate: A Qualitative Description of the Information Available on Popular Search Engines Regarding the Vaccine Debate.

Madeline Rhinesmith

Butler University, mlrhines@butler.edu

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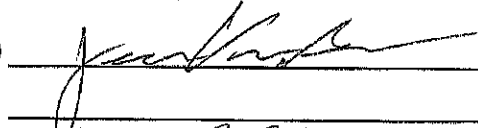
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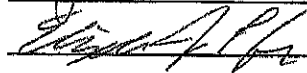
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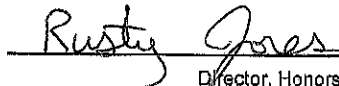


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**To Vaccinate or Not To Vaccinate: A Qualitative Description of the Information Available on
Popular Search Engines Regarding the Vaccine Debate.**

A Thesis

Presented to the Department of Science, Technology and Society

College of Liberal Arts in Sciences

and

The Honors Program

of

Butler University

In Partial Fulfillment

of the Requirements for Graduation Honors

Madeline Louise Rhinesmith

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Abstract

The current study looks at the assumption that that more information, along with improved access to that information could lead to more informed decisions through evaluating and critically reflecting on the vaccine debate. The research is done through the perspective of Science, Technology, and Society - an interdisciplinary field that analyzes the connection between scientific advancement and its implications on the world. This research seeks to replicate previous studies' which simple search engine websites were used to look at the websites people, including parents, are likely to encounter when they are researching information on vaccinations. This research seeks assess how and why it is that this debate continues to impact human behavior today. The research questions at hand are: What sort of information is the general public exposed to on popular search engines regarding the vaccine debate? How scientifically reliable and credible is this information? Answering these questions will allow for reflection on other questions, including: How does society benefit from the debate? How does society suffer? Through literature review this paper will explore the role that the Internet plays in the vaccination debate. The expected result is that the harder one looks into the controversy the more conflicting information one finds. The findings of this research suggest that more information and improved access to that information does not necessarily lead to better decision making, but rather leads to confusion and need for additional research because so much information exists on the Internet.

Introduction

Science, Technology, and Society (STS) is an interdisciplinary field that analyzes the connection between scientific advancement and its implications on the world. STS works from the recognition that science and technology are both thoroughly social processes. Looking at the debate over the safety and efficacy of vaccinations through the perspective of the field of Science, Technology, and Society highlights the dramatic relationship between research and the public. The discovery of vaccinations and the continued development of them is a prime example of science and technology affecting social, political, and economic institutions. Science discourse dominates the debate over vaccinating with both sides of the argument turning to scientific evidence in support of their opinion on the topic. Scientific claims pop up on both sides of the conflict. Scientific and technological professionals butt heads not only with each other but also with other groups in society in regards to the vaccination debate.

According to the Centers for Disease Control and Prevention (CDC), immunization is the number one achievement in public health in the twentieth century (CDC 1, 2013). Vaccinations not only protect individuals who receive them, but they also protect the community from communicable diseases. An economic analysis report given in March of 2011 found that with the implementation of a total of seventeen vaccines for preventable diseases, vaccination in the U.S. “prevents approximately 42,000 deaths and 20 million cases of disease, with net savings of nearly \$14 billion in direct costs and \$69 billion in total societal costs” (Domestic Public Health Achievements Team, 2011). Deaths in people under the age of twenty from varicella (chicken pox) declined 97% between 2005 and 2007 in the U.S. (Domestic Public Health Achievements Team, 2011). Yet some organizations and individuals question and

challenge the safety, efficacy, and use of certain ingredients in the most well known vaccines from the smallpox vaccine to the diphtheria, tetanus, and pertussis (DTP) vaccine to the measles, mumps, and rubella (MMR) vaccine (College of Physicians of Philadelphia, 2014). From the days of the first vaccine, conflicts between both arguments for and against vaccinations have made their way into the scene of public, medical, scientific, and political debate. The debate over whether or not to vaccinate children has generated hostility, confusion, and questions within and between members of society.

The modern day debate over vaccines centers on the alleged link between vaccinations and autism as well as other negative human health consequences. The contemporary debate began in England in 1998 when Dr. Andrew Wakefield published a paper linking the MMR vaccine to bowel disease and autism (Wakefield et. al., 1998). The findings published in his paper sparked fear in parents around the world about the safety of the vaccinations and intensified the debate around whether or not to vaccinate children. Wakefield's research also resulted in further research and inquiry by medical and scientific experts. Wakefield's study was eventually discredited and retracted by the original journal that published it, and in 2010 Britain stripped Wakefield of his medical license due to evidence that he lied about data in order to get the results he wanted (College of Physicians of Philadelphia, 2014). Adding to some parents' fears, some ingredients in the vaccines, including thimerosal came under fire because of the mercury they contained. It was believed that the mercury ingredient linked vaccines to autism, attention deficit hypersensitivity disorder, and speech or language delays (College of Physicians of Philadelphia, 2014). The vaccination debate and its consequences affect every person from newborns to the elderly.

The issues surrounding the safety and the necessity of vaccines highlights societal, scientific, and even technological conflicts that have permeated into all aspects of the public sphere. Scientists and medical professionals conduct research and speak on the topic almost daily. Politicians and government officials push for laws and regulations of vaccination requirements. Actors and actresses, like Jenny McCarthy have become so involved in the debate that they are seen as leaders of the anti-vaccination movement. Scientific and technological professionals work hard to convince members of society that the overall benefits of vaccinating children outweigh the perceived risks anti-vaccinating groups try to promote.

The current vaccine debate has essentially become a fight between the scientific and medical communities together against a growing portion of misinformed groups in society, both using science and technology to support and spread their messages. The contemporary debate emerged from scientific claims that have since been falsified. Still though, anti-vaccinators use the basis of Wakefield's study to claim and search for further causal links between vaccinations and autism. Pro-vaccinators fight the claims of the anti-vaccinators trying to convince society that vaccines are a vital part of public health today. Scientists subsequently work around the clock in various corners of the world to validate the safety and necessity of vaccines, trying harder than ever to convince anti-vaccinators that vaccines are a good thing. Studies from across the sciences have continually tried to reproduce the findings of Wakefield's original study but to date none have been able to do so (Fombonne and Chakrabarti, 2001). In short, many scientists' time is consumed by the debate on vaccines. Technology is the foundation upon which science builds to address the worries and concerns society has regarding the vaccination status of children.

Myriad types of people are involved in the controversy from parents to doctors, scientists to politicians. Schools and businesses face outbreak threats. Scientists face time crunches while fighting to ameliorate the conflict before pandemics rise. Technology is the bridge to allow scientists to have the equipment they need to address the concerns while it is also providing the information to society in general regarding the progression of the conflict and the knowledge that science gains everyday.

Easily accessible information via the Internet can provide parents with research findings, studies, and arguments regarding vaccinations, thus making the question of whether or not to vaccinate children a debate involving many parties, ranging from concerned parents and education professionals to scientists, researchers, medical professionals, and politicians. Battles over vaccinations are heavily debated over the Internet through social media, blogs, and scientific research articles. Through simple Internet searches one can quickly find websites, articles, and blogs backing both sides of the debate. The Internet is part of the reason why the anti-vaccinator movement has grown and continues to gain support (Witteman and Zikmund, 2011).

This research will look at how the vaccine debate can help us to critically reflect on and evaluate the assumption that more information, along with improved access to that information could lead to more informed decisions. Quick access to information affects all of society, giving both sides of the debate an avenue to influence anyone seeking information about vaccinations. The role of the internet, specifically Google, in the vaccination debate is in question here. This research seeks to replicate previous studies' which simple search engine websites were used to look at the websites people, including parents, are likely to encounter

when they are researching information on vaccinations. The findings from this research are then compared to previous research studies and the information is compiled together to critique the assumption that easier access to more and better information might lead to more informed decisions. Thus, the current research examines previous conducted studies centering on the vaccine debate in order to bring multiple areas of research into one argument, and then moves on to assess how and why it is that this debate continues to impact human behavior today. This project will assess the available information that might influence the decision making processes/possibilities of internet users. More specifically, this paper will address a series of questions, such as: What sort of information is the general public exposed to on popular search engines regarding the vaccine debate? How scientifically reliable and credible is this information? Answering these questions will allow for reflection on other questions, including: How does society benefit from the debate? How does society suffer? Through literature review this paper will explore the role that the Internet plays in the vaccination debate. A critical analysis of how each side of the debate supports and justifies its arguments and how the information is disseminated to the public will be considered, as will the appeals of both sides in their push for more support. Furthermore, this paper will use this debate as a lens through which to explore how science and technology interact with contemporary society.

Literature Review

Information surrounding the role of the internet in the vaccination debate is abundant. Multiple studies in the past 15 years have looked at how many pro vaccine versus how many anti vaccine websites appear on the most popular Internet search engines (Kata, 2012; Davies et. al., 2002; Witteman and Zikmund-Fisher, 2012). The internet is a quick and easy place for

individuals to turn to when looking for information on any number of subjects including information on vaccines. Using the internet one can quickly gain access to millions of articles, websites, and videos discussing vaccines, ranging in topic from the suggested timeline for vaccinations to information arguing against the safety of vaccines. The overall existing medical and scientific literature is abundant and strong in terms of connecting the modern day vaccine debate to information available via the Internet.

An article by Anna Kata in the journal *Vaccine* discusses the role of the Internet in the vaccine debate. Kata specifically discusses how the number of user-generated websites affects the vaccine debate since the transition from the idea of provider owned websites of Web 1.0 and the more user contributed information on websites of Web 2.0 (Kata, 2012). She suggests:

“Web 2.0 facilitates health communication – users can engage and educate others by sharing medical histories, treatment successes and failures, or experienced side-effects. Several salient themes have been identified when using the Internet in this way: the increased participation of patients as ‘active contributors’ in their own care, and their subsequent empowerment; the emergence of online communities and social networking; the sharing and collaboration of knowledge; and the personalization of healthcare” (Kata 3779, 2012).

The idea of Web 2.0 allows for medical knowledge to be more widespread today. It is no longer the case that doctors and other medical professionals have all the medical knowledge because with the Internet there is more information out in the world for the common person to read and interpret. “That officials speak with special authority or knowledge is a concept now rejected by laypeople, as readers encountering expertise may believe themselves to then be

experts... Anti-vaccine groups have harnessed postmodern ideologies, and by combining them with Web 2.0 and social media technologies, are able to effectively spread their messages” (Kata 3779, 2012). Kata’s report shows that 80% of Internet users are searching for information related to health care, 16% of searchers were looking for vaccination information, and of that group 70% said the information they encountered influenced the decisions they made (Kata, 2012). This illustrates that the information on the Internet is being used to shape and determine health decision making strategies by parents and care givers.

Kata notes the risks of encountering an anti-vaccination website on the Internet as parents becoming increasingly less likely to vaccinate their children after having spent only 5-10 minutes on an anti-vaccination website (Kata, 2012). She cites a study by Kortum and colleagues that explored how effective Internet users are at assessing whether or not a website is from a credible source or not, finding that 59% of participants deemed all the websites encountered while searching “vaccine safety” and “vaccine danger” were accurate but actually only 55% of the sites were inaccurate (Kata, 2012). This means that Internet search engine users are more likely to encounter inaccurate information than they are to encounter accurate information, while simultaneously interpreting the information as credible. In the same study, they found that 53% of the searchers left the experiment with misconceptions on vaccines (Kata, 2012). With so much information available online, individuals from the general population who are interested in learning more about vaccinations are likely to run into conflicting information, thus causing confusion. Kata noted that in a study by J.S. Downs and colleagues, 70% of parents said they would turn to the Internet for more information on

vaccines and 93% said yes when directly asked if they consult the internet for further information (Kata, 2012). Kata concludes that due to:

“the convenience of searching the Internet, the misinformation present online, the influence other media forms have had on vaccination rates, difficulties assessing source credibility, the effect mere minutes of viewing a negative website has on risk perception, and the lack of trust in authorities – is considered together, it seems inferable that anti-vaccine information from websites and other social media sources would impact vaccination decisions in some way” (Kata 3780, 2012).

This shows that more access to information does not necessarily mean the information is better and the decisions that result from accessing the Internet are not better informed decisions.

According to Davies, Chapman, and Leask in their 2002 study, there is a 43% chance that parents, when searching “vaccination” on one of seven Internet search engines, will encounter an anti-vaccination website (Davies et. al., 2002). Their study found that these anti-vaccination websites based their claims on an emotional appeal for those children diagnosed with autism, and they use scientific evidence that is either not cited or comes from self publications and alternative medicinal ideologies (Davies et. al., 2002). In a study by Witteman and Zikmund-Fisher, these researchers analyzed the impact of Internet provided information on decisions regarding health (Witteman and Zikmund-Fisher, 2012). They assessed the risk of encountering an anti-vaccination website and the impact that interaction can have on a person’s perception of the risks and benefits associated with vaccines, showing that even a short exposure to the anti-vaccination movement can increase the individual’s perception of risk while decreasing the perception of benefits of vaccines (Witteman and Zikmund-Fisher, 2012). Their study further

validates the importance and the impact that technology can have in the vaccine debate, ultimately seeming to bolster the anti-vaccination argument. The Internet supplies vast amounts of information to anyone with access to it, but people must critically analyze any and all information they gain from an Internet source because not all claims are valid. Technology also plays a role in the argument through its contributions to advancing science and helping to further research. Technology is the communicator and the collaborator between science and society in the struggle to answer all the questions involved in the conflict over vaccinations.

In response to all the anti-vaccination claims linking autism to vaccine a review report of the conflict of vaccination status published in May 2014 by the Institute of Medicine summarized the claims from both anti-vaccinators and pro-vaccinators coming to the conclusion that there is no evidence to support the claim of a relationship between vaccines and autism rates (CDC 2, 2014). The Immunization Safety Review Committee of the Institute of Medicine looked at epidemiologic studies and biological mechanisms, along with the claims from both parties when it concluded, “the body of epidemiological evidence favors rejection of a causal relationship between the MMR vaccine and autism. The committee also concludes that the body of epidemiological evidence favors rejection of a causal relationship between thimerosal-containing vaccines and autism. The committee further finds that potential biological mechanisms for vaccine-induced autism that have been generated to date are theoretical only.” (Immunization Safety Review Committee, 2014).

It is more than just search engines that spread information on vaccines, both for and against. Social media also plays a role in the online vaccine debate. Research analyzing videos on YouTube containing vaccination information reveals that 32% contain messages with anti-

vaccination information and sentiments, and further, that such videos have more views and higher ratings when compared to pro-vaccination videos (Kata, 2012). Social media posts and comments responding to articles or blogs online exhibit information from all types of people on both sides of the debate. There is no regulation on who can post online and what they can and cannot say. Therefore, social media exposes people to all sorts of information pertaining to the vaccine debate on both sides.

With the widespread use of the Internet, people have increased access to more websites with more information than ever in regards to the vaccine debate, but Kata argues that this access is not necessarily a good thing. Not only do many websites exist that share anti-vaccination information, but the language these websites use is “cunning” and “camouflaged in unobjectionable rhetoric” (Kata, 2012). The use of the Internet allows the patient, or guardian, to gain information about health related topics from a source other than the doctor before making a decision about his or her own health care.

But whether or not to vaccinate is not simply a personal matter. Decisions about vaccinating a child affect that child in particular as well as all the children he or she comes in contact with. When parents elect not to vaccinate their children, they not only put their child at risk of contracting various diseases, but also put other children who cannot receive vaccines for various reasons, at risk. These at risk children may be allergic to an ingredient used in the vaccine or immunocompromised due to severe illnesses or cancers that make them ineligible for vaccines even if they wanted to receive them (CDC 3, 2014). Having an underlying condition, like cancer or another severe illness makes many children ineligible for vaccinations because their bodies cannot tolerate the vaccine without being at risk for severe, life threatening side

effects (CDC 3, 2014). Pregnant women are also ineligible to receive certain vaccines and contracting an illness while pregnant jeopardizes the life of the mother and the life of the child (CDC 3, 2014). These unvaccinated children and women rely on the theory of herd immunity, which states that if enough people in a community are immune to a disease, the disease is unlikely to spread to someone without immunity (CDC 4, 2014). But herd immunity decreases as fewer and fewer people receive vaccinations because the disease can spread, putting the ineligible at risk. This puts society up against itself leaving the parents of ineligible children to plead with parents that choose not to vaccinate to look at scientific and technological facts and change their minds.

After reviewing some of the literature on the role of the Internet in the vaccine debate, it becomes clear that the information on vaccines on the Internet is abundant. Patients and guardians with access to the Internet are increasingly likely to encounter anti-vaccination information. These encounters have been shown to affect the decisions individuals make regarding their own, or their child's, vaccination status. The previously conducted studies contributed to the development of this current study and the evaluation of number of anti versus pro vaccination websites that exist today.

Methods

The present study seeks to evaluate the information available through the frequently used Internet search engine Google in order to analyze the assumption that easier access to more and better information might lead to better decisions. This process allows for addressing multiple questions including: What sort of information is the general public exposed to on popular search engines regarding the vaccine debate? How scientifically reliable and credible is

this information? The expected result is that the harder one looks into the controversy the more conflicting information one finds.

This research consists of an exploratory and descriptive study of information available on the Internet regarding the vaccination debate through discourse analysis and qualitative analysis. Discourse analysis is the idea that “there is much more going on when people communicate than simply the transfer of information” (“Discourse Analysis.”). Discourse analysis is based on text and is a search for patterns, linkages, structures, and ideas that emerge within the text. This process of analyzing the text available regarding the vaccine debate will allow me to look at “what language is used for” in order to communicate arguments to the readers through the various forms of information accessed on vaccines (Brown, 1). Qualitative approaches search for “an answer about understanding participants’ views” and will be useful in looking at what information parents are exposed to on the Internet regarding vaccines (Green, 38). This approach is used to look at how the information provided to parents is conveyed and the implications of the language that is presented on the various websites. Analysis of other research studies and their findings is used to look for patterns. This study utilizes the process of open coding: the idea that you do not have a codes initially but rather will be looking for patterns and themes to lead to a systematic way to measure and code the various findings after initial analysis. This process allows for research without preconceived ideas of what one will find so that patterns emerge instead of finding information to fit expectations.

The current study draws on data collected through a weekly Google search of the phrase “vaccine and autism” over a period of ten weeks. Due to the nature of Google in today’s

modern world and advertisement tracking, a Google Chrome Incognito browser tab was used. Each week, beginning the week of Monday, October 12, 2015 and ending the week of Monday, December 21, 2015, a Google search of “vaccine and autism” was performed and then the first ten links encountered, excluding scholarly articles (see discussion section), were evaluated and categorized into one of five categories: (1) entirely pro vaccine (Pro) , (2) questionable but mostly pro vaccine (“Pro”), (3) neither pro nor anti vaccine (General), (4) questionable but mostly anti vaccine (“Anti”), and (5) entirely anti vaccine (Anti).

Each link was thoroughly read through and examined to ascertain the author(s) perspective on the vaccination debate and to determine the intended message of the website. The information provided was evaluated for how scientifically informed the claims were and how scientific discourse was used to convey the information. After reading each link, the link was categorized based on whether or not the author provided arguments for or against vaccines. The “entirely pro vaccine” category includes websites that provide information debunking the anti vaccination claims and promoting the safety and necessity of vaccines. The “questionable but mostly pro vaccine” category is comprised of websites that are attempting to promote vaccines but in doing so bring up anti-vaccine arguments without completely negating said arguments. The “neither pro nor anti vaccine” category includes websites that simply provide information on vaccines and/or autism without picking a side in the debate. The “questionable but mostly anti vaccine” category contains websites that are attempting to argue against vaccines but also still present pro vaccine information without entirely discrediting that information. The “entirely anti vaccine” category consists of websites that provide information promoting anti vaccination claims and completely discredit pro vaccine arguments. For a

complete list of all links encountered during this study, organized by date and category, see

table 1.

Table 1

Week	Date	Website Title	Link	Category
1	10/13/15	Skeptic	http://www.skeptic.com/eskeptic/09-06-03/?gclid=Clvto9_Ev8gCFQYlaQod2x8GTg#feature	Pro
1	10/13/15	Focus for Health	https://www.focusforhealth.org/autism-and-vaccines-debate/?gclid=CKXikdbFv8gCFYU9aQod9q4L9Q	“Anti”
1	10/13/15	CDC	http://www.cdc.gov/vaccinesafety/concerns/autism.html	Pro
1	10/13/15	WebMD	http://www.webmd.com/brain/autism/searching-for-answers/vaccines-autism	“Anti”
1	10/13/15	Oxford Journals	http://cid.oxfordjournals.org/content/48/4/456.full	“Pro”
1	10/13/15	Autism Speaks	https://www.autismspeaks.org/science/policy-statements/information-about-vaccines-and-autism	General
1	10/13/15	Voices for Vaccines	http://www.voicesforvaccines.org/how-my-daughter-taught-me-that-vaccines-do-not-cause-autism/	Pro
1	10/13/15	Natural News	http://www.naturalnews.com/051527_Donald_Trump_vaccines_autism.html	Anti
1	10/13/15	Age of Autism	http://www.ageofautism.com/2015/10/canadian-doctor-calls-for-hpv-vaccine-moratorium.html	Anti
1	10/13/15	Autism Daily News	http://www.autismdailynewscast.com/vaccines-dont-actually-cause-autism-anti-vaxxer-study-finds/31997/reprint/	Pro
2	10/23/15	CDC	http://www.cdc.gov/vaccinesafety/concerns/autism.html	Pro
2	10/23/15	WebMD	http://www.webmd.com/brain/autism/searching-for-answers/vaccines-autism	“Anti”
2	10/23/15	Oxford Journals	http://cid.oxfordjournals.org/content/48/4/456.full	“Pro”
2	10/23/15	Autism Speaks	https://www.autismspeaks.org/science/policy-statements/information-about-vaccines-and-autism	General

2	10/23/15	Voices for Vaccines	http://www.voicesforvaccines.org/how-my-daughter-taught-me-that-vaccines-do-not-cause-autism/	Pro
2	10/23/15	Voices for Vaccines	http://www.voicesforvaccines.org/mmr-and-autism-our-story/	Pro
2	10/23/15	The Hill	http://thehill.com/policy/healthcare/257581-house-republican-resurfaces-claims-of-cdc-vaccine-cover-up	Anti
2	10/23/15	Natural News	http://www.naturalnews.com/051668_autistic_muppet_Sesame_Street_vaccine_injuries.html#	Anti
2	10/23/15	Forbes	http://www.forbes.com/sites/emilywillingham/2015/10/21/former-u-s-rep-dan-burton-vaccine-foe-now-lobbying-for-scientology-outfit/	Anti
2	10/23/15	Science based Medicine	https://www.sciencebasedmedicine.org/reference/vaccines-and-autism/	Pro
3	11/1/15	CDC	http://www.cdc.gov/vaccinesafety/concerns/autism.html	Pro
3	11/1/15	WebMD	http://www.webmd.com/brain/autism/searching-for-answers/vaccines-autism	"Anti"
3	11/1/15	Oxford Journals	http://cid.oxfordjournals.org/content/48/4/456.full	"Pro"
3	11/1/15	Autism Speaks	https://www.autismspeaks.org/science/policy-statements/information-about-vaccines-and-autism	General
3	11/1/15	Autism Science Foundation	http://autismsciencefoundation.org/what-is-autism/autism-and-vaccines/	Pro
3	11/1/15	Voices for Vaccines	http://www.voicesforvaccines.org/how-my-daughter-taught-me-that-vaccines-do-not-cause-autism/	Pro
3	11/1/15	Voice for Vaccines	http://www.voicesforvaccines.org/mmr-and-autism-our-story/	Pro
3	11/1/15	Free Thought Project	http://thefreethoughtproject.com/cdc-scientist-admits-destroyed-data-showed-vaccines-caused-autism-children/	Anti
3	11/1/15	Eco Watch	https://ecowatch.com/2015/11/01/cdc-vaccine-cover-up-autism/	Anti

3	11/1/15	YouTube – Reality Check	https://www.youtube.com/watch?v=lnS-xJCG6i4	Anti
4	11/8/15	Skeptic	http://www.skeptic.com/eskeptic/09-06-03/?gclid=Clvto9_Ev8gCFQYlaQod2x8GTg#feature	Pro
4	11/8/15	CDC	http://www.cdc.gov/vaccinesafety/concerns/autism.html	Pro
4	11/8/15	WebMD	http://www.webmd.com/brain/autism/searching-for-answers/vaccines-autism	“Anti”
4	11/8/15	Oxford Journals	http://cid.oxfordjournals.org/content/48/4/456.full	“Pro”
4	11/8/15	Autism Speaks	https://www.autismspeaks.org/science/policy-statements/information-about-vaccines-and-autism	General
4	11/8/15	Autism Science Foundation	http://autismsciencefoundation.org/what-is-autism/autism-and-vaccines/	Pro
4	11/8/15	Voices for Vaccines	http://www.voicesforvaccines.org/how-my-daughter-taught-me-that-vaccines-do-not-cause-autism/	Pro
4	11/8/15	Voices for Vaccines	http://www.voicesforvaccines.org/mmr-and-autism-our-story/	Pro
4	11/8/15	Science based Medicine	https://www.sciencebasedmedicine.org/reference/vaccines-and-autism/	Pro
4	11/8/15	Age of Autism	http://www.ageofautism.com/vaccines/	Anti
5	11/20/15	CDC	http://www.cdc.gov/vaccinesafety/concerns/autism.html	Pro
5	11/20/15	Autism Speaks	https://www.autismspeaks.org/science/policy-statements/information-about-vaccines-and-autism	General
5	11/20/15	Oxford Journals	http://cid.oxfordjournals.org/content/48/4/456.full	“Pro”
5	11/20/15	WebMD	http://www.webmd.com/brain/autism/searching-for-answers/vaccines-autism	“Anti”

5	11/20/15	Autism Science Foundation	http://autismsciencefoundation.org/what-is-autism/autism-and-vaccines/	Pro
5	11/20/15	Voices for Vaccines	http://www.voicesforvaccines.org/how-my-daughter-taught-me-that-vaccines-do-not-cause-autism/	Pro
5	11/20/15	Voices for vaccines	http://www.voicesforvaccines.org/mmr-and-autism-our-story/	Pro
5	11/20/15	Salon	http://www.salon.com/2015/11/19/wrong_again_jenny_mccarthy_first_it_was_vaccines_and_autism_now_its_hiv/	Anti
5	11/20/15	Age of Autism	http://www.ageofautism.com/2015/11/autism-parent-reality-what-has-changed.html	Anti
5	11/20/15	Science based Medicine	https://www.sciencebasedmedicine.org/reference/vaccines-and-autism/	Pro
6	11/26/15	CDC	http://www.cdc.gov/vaccinesafety/concerns/autism.html	Pro
6	11/26/15	Autism Speaks	https://www.autismspeaks.org/science/policy-statements/information-about-vaccines-and-autism	General
6	11/26/15	Autism Science Foundation	http://autismsciencefoundation.org/what-is-autism/autism-and-vaccines/	Pro
6	11/26/15	WebMD	http://www.webmd.com/brain/autism/searching-for-answers/vaccines-autism	"Anti"
6	11/26/15	Oxford Journals	http://cid.oxfordjournals.org/content/48/4/456.full	"Pro"
6	11/26/15	Voices for Vaccines	http://www.voicesforvaccines.org/how-my-daughter-taught-me-that-vaccines-do-not-cause-autism/	Pro
6	11/26/15	Voices for Vaccines	http://www.voicesforvaccines.org/mmr-and-autism-our-story/	Pro
6	11/26/15	Science based Medicine	https://www.sciencebasedmedicine.org/reference/vaccines-and-autism/	Pro
6	11/26/15	How Do Vaccines	http://howdovaccinescauseautism.com/	Pro

6	11/26/15	Forbes	http://www.forbes.com/sites/emilywillingham/2014/02/22/is-the-cdc-hiding-data-about-mercury-vaccines-and-autism/#495609374f12	“Pro”
7	12/5/15	Skeptic	http://www.skeptic.com/eskeptic/09-06-03/?gclid=Clvto9_Ev8gCFQYlaQod2x8GTg#feature	Pro
7	12/5/15	CDC	http://www.cdc.gov/vaccinesafety/concerns/autism.html	Pro
7	12/5/15	Oxford Journals	http://cid.oxfordjournals.org/content/48/4/456.full	“Pro”
7	12/5/15	Autism Speaks	https://www.autismspeaks.org/science/policy-statements/information-about-vaccines-and-autism	General
7	12/5/15	Autism Science Foundation	http://autismsciencefoundation.org/what-is-autism/autism-and-vaccines/	Pro
7	12/5/15	WebMD	http://www.webmd.com/brain/autism/searching-for-answers/vaccines-autism	“Anti”
7	12/5/15	Voices for Vaccines	http://www.voicesforvaccines.org/how-my-daughter-taught-me-that-vaccines-do-not-cause-autism/	Pro
7	12/5/15	Voices for Vaccines	http://www.voicesforvaccines.org/mmr-and-autism-our-story/	Pro
7	12/5/15	Science based Medicine	https://www.sciencebasedmedicine.org/reference/vaccines-and-autism/	Pro
7	12/5/15	Age of Autism	http://www.ageofautism.com/2015/10/canadian-doctor-calls-for-hpv-vaccine-moratorium.html	Anti
8	12/12/15	Skeptic	http://www.skeptic.com/eskeptic/09-06-03/?gclid=Clvto9_Ev8gCFQYlaQod2x8GTg#feature	Pro
8	12/12/15	Focus for Health	https://www.focusforhealth.org/autism-and-vaccines-debate/?gclid=CKXikdbFv8gCFYU9aQod9q4L9Q	“Anti”
8	12/12/15	Children’s MN	http://www.childrensmn.org/educationmaterials/parents/article/12583/is-there-a-connection-between-vaccines-and-autism/?gclid=CNi329nG1skCFYQ6aQodsU0DTA	Pro
8	12/12/15	CDC	http://www.cdc.gov/vaccinesafety/concerns/autism.html	Pro

8	12/12/15	Autism Speaks	https://www.autismspeaks.org/science/policy-statements/information-about-vaccines-and-autism	General
8	12/12/15	Oxford Journals	http://cid.oxfordjournals.org/content/48/4/456.full	“Pro”
8	12/12/15	Autism Science Foundation	http://autismsciencefoundation.org/what-is-autism/autism-and-vaccines/	Pro
8	12/12/15	WebMD	http://www.webmd.com/brain/autism/searching-for-answers/vaccines-autism	“Anti”
8	12/12/15	Voices for Vaccines	http://www.voicesforvaccines.org/how-my-daughter-taught-me-that-vaccines-do-not-cause-autism/	Pro
8	12/12/15	Science based Medicine	https://www.sciencebasedmedicine.org/reference/vaccines-and-autism/	Pro
9	12/18/15	CDC	http://www.cdc.gov/vaccinesafety/concerns/autism.html	Pro
9	12/18/15	Autism Science Foundation	http://autismsciencefoundation.org/what-is-autism/autism-and-vaccines/	Pro
9	12/18/15	Oxford Journals	http://cid.oxfordjournals.org/content/48/4/456.full	“Pro”
9	12/18/15	Autism Speaks	https://www.autismspeaks.org/science/policy-statements/information-about-vaccines-and-autism	General
9	12/18/15	WebMD	http://www.webmd.com/brain/autism/searching-for-answers/vaccines-autism	“Anti”
9	12/18/15	Voices for Vaccines	http://www.voicesforvaccines.org/how-my-daughter-taught-me-that-vaccines-do-not-cause-autism/	Pro
9	12/18/15	Voices for Vaccines	http://www.voicesforvaccines.org/mmr-and-autism-our-story/	Pro
9	12/18/15	JURIST: Mary Holland	http://www.ageofautism.com/2015/12/jurist-mary-holland-on-legality-of-censoring-speech-on-vaccines-autism-.html	Anti
9	12/18/15	ABC 7 NY	http://abc7ny.com/health/blocked-judges-nyc-flu-vaccine-requirement-for-preschoolers/1126379/	“Pro”

9	12/18/15	Age of Autism	http://www.ageofautism.com/2015/12/nyt-reports-preschool-flu-shot-mandate-shot-down-by-ny-supreme-court.html	Anti
10	12/26/15	CDC	http://www.cdc.gov/vaccinesafety/concerns/autism.html	Pro
10	12/26/15	Autism Speaks	https://www.autismspeaks.org/science/policy-statements/information-about-vaccines-and-autism	General
10	12/26/15	Autism Science Foundation	http://autismsciencefoundation.org/what-is-autism/autism-and-vaccines/	Pro
10	12/26/15	Oxford Journals	http://cid.oxfordjournals.org/content/48/4/456.full	“Pro”
10	12/26/15	WebMD	http://www.webmd.com/brain/autism/searching-for-answers/vaccines-autism	“Anti”
10	12/26/15	Voices for Vaccines	http://www.voicesforvaccines.org/how-my-daughter-taught-me-that-vaccines-do-not-cause-autism/	Pro
10	12/26/15	Voices for Vaccines	http://www.voicesforvaccines.org/mmr-and-autism-our-story/	Pro
10	12/26/15	Science based Medicine	https://www.sciencebasedmedicine.org/reference/vaccines-and-autism/	Pro
10	12/26/15	Age of Autism	http://www.ageofautism.com/2015/10/canadian-doctor-calls-for-hpv-vaccine-moratorium.html	Anti
10	12/26/15	Forbes	http://www.forbes.com/sites/emilywillingham/2014/02/22/is-the-cdc-hiding-data-about-mercury-vaccines-and-autism/#495609374f12	“Pro”

Results

The results of the 10 weeks of Google searching are listed in full in table 1. Each week, the first 10 websites were listed amounting to 100 total websites, which included 28 different websites over the 10-week course. There were 50 websites that fell into the entirely pro vaccine category (Pro), 13 websites in the questionable but mostly pro vaccine category (“Pro”), 10 websites categorized as neither pro nor anti vaccine (General), 12 websites listed as

questionable but mostly anti vaccine (“Anti”), and 15 websites in the entirely anti vaccine category (Anti)l. See table 2 for number of encounters for each website.

Table 2

Website Title	Link	# of Encounters
Skeptic	http://www.skeptic.com/eskeptic/09-06-03/?gclid=Clvto9_Ev8gCFQYlaQod2x8GTg#feature	4
Focus for Health	https://www.focusforhealth.org/autism-and-vaccines-debate/?gclid=CKXikdbFv8gCFYU9aQod9q4L9Q	2
CDC	http://www.cdc.gov/vaccinesafety/concerns/autism.html	10
WebMD	http://www.webmd.com/brain/autism/searching-for-answers/vaccines-autism	10
Oxford Journals	http://cid.oxfordjournals.org/content/48/4/456.full	10
Autism Speaks	https://www.autismspeaks.org/science/policy-statements/information-about-vaccines-and-autism	10
Voices for Vaccines	http://www.voicesforvaccines.org/how-my-daughter-taught-me-that-vaccines-do-not-cause-autism/	10
Natural News	http://www.naturalnews.com/051527_Donald_Trump_vaccines_autism.html	1
Age of Autism	http://www.ageofautism.com/2015/10/canadian-doctor-calls-for-hpv-vaccine-moratorium.html	3
Autism Daily News	http://www.autismdailynewscast.com/vaccines-dont-actually-cause-autism-anti-vaxxer-study-finds/31997/reprint/	1
Voices for Vaccines	http://www.voicesforvaccines.org/mmr-and-autism-our-story/	8
The Hill	http://thehill.com/policy/healthcare/257581-house-republican-resurfaces-claims-of-cdc-vaccine-cover-up	1
Natural News	http://www.naturalnews.com/051668_autistic_muppet_Sesame_Street_vaccine_injuries.html#	1
Forbes	http://www.forbes.com/sites/emilywillingham/2015/10/21/former-u-s-rep-dan-burton-vaccine-foe-now-lobbying-for-scientology-outfit/	1
Science based Medicine	https://www.sciencebasedmedicine.org/reference/vaccines-and-autism/	7

Autism Science Foundation	http://autismsciencefoundation.org/what-is-autism/autism-and-vaccines/	8
Free Thought Project	http://thefreethoughtproject.com/cdc-scientist-admits-destroyed-data-showed-vaccines-caused-autism-children/	1
Eco Watch	https://ecowatch.com/2015/11/01/cdc-vaccine-cover-up-autism/	1
YouTube Reality Check	https://www.youtube.com/watch?v=lnS-xJCG6i4	1
Age of Autism	http://www.ageofautism.com/vaccines/	1
Salon	http://www.salon.com/2015/11/19/wrong_again_jenny_mccarthy_first_it_was_vaccines_and_autism_now_its_hiv/	1
Age of Autism	http://www.ageofautism.com/2015/11/autism-parent-reality-what-has-changed.html	1
How Do Vaccines	http://howdovaccinescauseautism.com/	1
Forbes	http://www.forbes.com/sites/emilywillingham/2014/02/22/is-the-cdc-hiding-data-about-mercury-vaccines-and-autism/#495609374f12	2
Children's MN	http://www.childrensmn.org/educationmaterials/parents/article/12583/is-there-a-connection-between-vaccines-and-autism/?gclid=CNi329nG1skCFYQ6aQodsU0DTA	1
JURIST: Mary Holland	http://www.ageofautism.com/2015/12/jurist-mary-holland-on-legality-of-censoring-speech-on-vaccines-autism-.html	1
ABC 7 NY	http://abc7ny.com/health/blocked-judge-nixes-nyc-flu-vaccine-requirement-for-preschoolers/1126379/	1
Age of Autism	http://www.ageofautism.com/2015/12/nyt-reports-preschool-flu-shot-mandate-shot-down-by-ny-supreme-court.html	1

Discussion

Approximately half of the encounters in this study were categorized as entirely pro vaccination. There were 40 encounters that had at least some anti vaccine information on them that caused them to not be grouped as entirely pro vaccine. The remaining 10 encounters, which all came from the same website, presented information on both sides of the debate, causing them to be coded/described/labelled as neither pro or anti vaccine. Of the 50 labelled

pro websites, 9 came from different websites. There were 3 different websites that made up the “pro” category, 2 different websites made up the “anti” category, and 13 different websites made up the anti category. This means that nearly half (13 of 28) of the different websites encountered over the 10-week time frame were anti vaccination in nature. Adding the additional 2 websites categorized as “anti” vaccine, that is exactly half of all the websites encountered.

Each website was read and the content analyzed before categorization. See table 3 for a detailed list of why each website fit the category it was given.

Table 3.

Reference to Citation	Category	Explanation
Hall, 2009	Pro	This article is on the Skeptics website. It discusses the controversy over vaccines. The information it presents is entirely pro vaccine because it debunks all the anti-vaccination claims.
Focus for Health, 2015	“Anti”	This article reports information on the pro-vaccination side of the debate but continues to question whether or not the information is correct. It talks specifically about how parents of children with autism can be compensated by the vaccine companies. The overall tone of this website is anti-vaccination, however it does offer some information on the pro-vaccine side making it “anti”.
CDC 2	Pro	This article comes directly from the CDC. It flat states that vaccines do not cause autism and therefore all the information found in this website is in favor of vaccines making it pro.
Downs, 2008	“Anti”	This article is on WebMD. It presents large amounts of information supporting the anti-vaccinate side of the debate. This meant it was immediately put into the anti category but upon further reading it does offer some of the pro-vaccine information. But due to the fact that it does not completely discredit the pro-vaccination arguments it is in the “anti” category.
Gerber and Offit, 2008	“Pro”	This website comes from the Oxford Journals. It is categorized as “pro” because it’s overall conclusion is in favor of vaccines and that vaccines do not cause autism. However because it discusses in detail all the reasons the anti-vaccination side uses to argue it can have a slightly anti-vaccine tone if not read in its entirety.

Wright, 2015	General	This website is on the Autism Speaks website, which is the foundation for autism support and research. This website is categorized as general because the information it supplies does not truly argue for or against vaccines. It presents both arguments equally.
Russo, 2014	Pro	This article is on the Voices for Vaccines webpage. It is categorized as Pro because it shares the story of how one mother came to pick a side in the debate through personal experiences. It presents the information that would be anti-vaccine but completely refutes it in favor of pro-vaccine.
Johnson, 2015	Anti	This article is on the Natural News website. It discusses how Presidential candidate Donald Trump is anti-vaccination. This article is clearly Anti from the start as it is acknowledging that Trump supporting anti-vaccination is the only candidate acknowledging the truth.
Age of Autism 1, 2015	Anti	This website is sponsored by some of the major players on the anti-vaccination side of the debate. This article is categorized as Anti because it gives all information on the side that vaccines are not safe.
Bushak, 2015	Pro	This article is on Autism Daily News. It is categorized as Pro because it discusses a specific study that found zero link between autism and vaccines while also criticizing anti-vaccination claims.
O'Callaghan, 2013	Pro	This article is on the Voices for Vaccines website. It discusses a little boy who was both vaccinated and diagnosed with autism. But the mother is speaking specifically about how the two are a coincidence not causation. It is Pro because it discredits all anti-vaccine ideas.
Feris, 2015	Anti	This article is Anti because it never once brings up pro-vaccine information and only talks about possible CDC cover ups that would fully support the anti-vaccine debate.
Adams, 2015	Anti	This article is on the Natural News website. It is categorized as anti because it only presents anti-vaccination information and makes a mockery out of pro-vaccine claims.
Willingham 1, 2015	Anti	This article is on Forbes website. It discusses one politician's claims and links to the anti-vaccination side of the debate. It is anti because it never acknowledges pro-vaccine arguments.
Science-Based Medicine, 2015	Pro	This article is an overview of the vaccine and autism debate. It is categorized as Pro because it comes to a definitive conclusion in the pro-vaccine side of the debate. It also debunks all information from the anti-vaccine side.
Autism Science Foundation, 2015	Pro	This page is categorized as Pro because all the information it provides leads to a Pro-vaccine conclusion. Any anti-vaccine information seen on this page is countered against with pro-vaccine information.

Agorist, 2015	Anti	This article is on the website The Free Thought Project. It is categorized as Anti because it discusses the issues with the CDC possibly concealing information about a link between autism and vaccines. It does not present pro-vaccine information.
Kennedy, 2015	Anti	This article is on the EcoWatch website. It is categorized as Anti because it discusses a report that the CDC covered up information linking vaccines to autism. It does not discuss any pro-vaccine ideas.
Swann, 2015	Anti	This is a video posted on YouTube of a news report on the idea that the CDC covered up information regarding a link between vaccines and autism. It does not discuss pro-vaccine claims.
Age of Autism 2, 2015	Anti	This page is a series of posts that is updated regularly with new posts regarding vaccines and autism together. It is categorized as Anti because its sponsors are major players in the anti-vaccination debate and is full of anti-vaccination ideas.
Williams, 2015	Anti	This article is on the Salon website. It is categorized as anti because the little information it presents on the vaccine debate is entirely anti-vaccination information without pro-vaccine information.
Berger, 2015	Anti	This article is posted on the Age of Autism website- sponsored by major players on the anti-vaccine side. It is categorized as anti because it is a mother telling her story that links the vaccine her child received to the diagnosis of autism.
“How Do Vaccines Cause Autism?”, n.d.	Pro	This website is clearly an amateur website that has little to no information. It simply makes one claim that vaccines do not cause autism. Therefore, it is categorized as pro because it does not have any information on the anti-vaccine arguments. Viewer discretion is advised.
Willingham 2, 2015	“Pro”	This article is on Forbes. It is categorized as “Pro” because it makes a straightforward claim against anti-vaccination ideas. However, it still is heavy with anti-vaccination information making it not so obviously pro-vaccine.
Gupta, 2015	Pro	This article is on the Children’s Hospital Network website for Minnesota. It is categorized as Pro because it flat out states that there is no connection between vaccine and autism.
Age of Autism 3, 2015	Anti	This article is on the Age of Autism website. It is categorized as Anti because 1) the sponsors of the website are major players on the anti-vaccine side and 2) it is questioning the claims of pro-vaccine saying anti-vaccine is wrong.
Burkett, 2015	“Pro”	This is a news story out of New York. It is categorized as Pro because it is presenting information that is all pro-vaccine. However, it is written in response to success in court against vaccine mandates, an anti-vaccine idea.

Age of Autism 4, 2015	Anti	This article is categorized as Anti because 1) the sponsors of the website are anti-vaccine advocates and 2) because it is celebrating the court decision against vaccine mandates.
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It is important to note that during the Google searches, any links that appeared requiring a username and password or some kind of subscription to the website before being able to read the information provided were not examined. This was done because the purpose of this study was to examine information available to the general population on the Internet. In requiring a login or a subscription, this limits the number of people who are likely to encounter the website. Many of these websites do not come from what would be considered reliable sources as the vast majority of them rely on opinions and have an agenda at stake.

One pattern that emerged from the data is the fact that 5 of the 13 Anti websites come from sources sponsored by Generation Rescue organization, the biggest name on the anti vaccination side of the debate with the current president being Jenny McCarthy. This suggests that the Generation Rescue organization is a loud group working hard to get their message out through multiple different websites. This further suggests that much of the information available is coming from the same sources. This organization seeks to provide emotional, financial, and informational support to families of children diagnosed with an Autism Spectrum Disorder (“Generation Rescue”, 2016). The organization was founded by the parents of a young boy named Jamison after he was diagnosed with Autism and the parents did research on the disorder before coming to the conclusion that “the combination of antibiotics and vaccines administered to Jamison in his first 18 months of life had overwhelmed his system and triggered his body into a state of being that we currently call autism” (“Generation Rescue”, 2016). The organization’s website provides information on how to find a family physician that is

in favor of alternative vaccination schedules or willing to provide vaccination waivers to parents who do not choose to have their child(ren) vaccinated (“Generation Rescue”, 2016). These messages are shared through the many websites and organizations that Generation Rescue helps to support and sponsor.

A second pattern that emerges is the idea that the pro vaccine websites encountered do not necessarily work to discredit anti-vaccination statements. The pro-vaccination websites bluntly state that vaccines do not cause autism and then go on to report on the benefits of vaccinations. These websites briefly mention the reasons that the anti-vaccination side of the debate use to claim a link between autism and vaccines but spend a majority of their efforts presenting the evidence on the safety and necessity of vaccines. For example, the CDC website encountered during each week of the searches directly states, “Vaccines do not cause autism,” “There is no link between vaccines and autism”, and “Vaccine ingredients do not cause autism” (CDC 2, 2014). The Science Based Medicine website encountered numerous times concludes its information with the statement, “[the anti-vaccinators’] claims have no scientific validity” (Science Based Medicine, 2015). This counters the methods of 3 of the other 4 categories, not including general. The reason the “pro” websites end up in this category is due to the fact that they bring up the claims of the anti-vaccination side of the debate. The “anti” websites similarly bring up the pro vaccination arguments making the anti statements slightly less powerful. The anti vaccinate websites work hard to discredit the pro vaccine arguments. The anti websites are not nearly as straightforward and blunt with their claims as the pro websites are with their claims. For example, the Robert Kennedy article on the EcoWatch website is attempting to share a story about the CDC hiding information by relying on one person’s claims and quoting

one person who reports a link between the MMR vaccine and autism (Kennedy, 2015). The article on Natural News by Mike Adams discussing the Sesame Street Character Julia who has autism is ridiculing vaccines and the vaccine industry for its attempt to hide a link between vaccines and autism all the while trying to make autism look “normal” (Adams, 2015). The anti websites are pulling hard to find information they can use to support their ideas and spread their message.

The 4 categories excluding general have emotional appeals as well. The idea is that by sharing personal stories the websites will make a personal connection with parents to leave a more lasting impression. The Voices for Vaccines website which was encountered 18 times throughout the 10 week course and is considered to be a part of the Pro category shares two personal stories of how two families came to the conclusion that vaccines are safe and do not cause autism. The article by Juniper Russo catalogs her emotional journey with her two children and her personal struggle with the vaccine debate before she reports her conclusion that the vaccines are not the blame for her daughter’s autism (Russo, 2014). The article by Martine O’Callaghan talks about her son who was diagnosed with Autism but also how looking back she knew he had autism long before he received the MMR vaccine (O’Callaghan). At the opposite end of the categories, the anti websites also use emotional appeals. An article by Mike Adams talks about how children diagnosed with autism are “victimized by vaccines” and even brings in the present campaign “#BlackLivesMatter” because of the report that the CDC hid information linking the MMR vaccine to increased risk of autism in African American Males and he further concludes that the CDC is arguing that “#BlackLivesDoNOTMatter” (Adams, 2015). Dara Berger, in her article on the Age of Autism, similar to the voices for vaccines articles, catalogs a

mother's experience with a child being diagnosed with autism and her coming to the conclusion vaccines were not safe for her child and now she is working to become a Holistic Health (Berger, 2015). Emotional appeals have the ability to leave a lasting impact on viewers.

Similar to findings of Davies and colleagues in 2002, this study found that there is a 50% chance that person searching the phrase "vaccine and autism" on Google will encounter at least one website that has information on it that can be interpreted as anti-vaccination (Davies et al., 2002). While the search phrase used by Davies et al. was different than the current study, they are similar. The two studies had end goals that were alike. The Witteman and Zikmund-Fisher study of 2012 concluded that encountering an anti-vaccination website can increase a viewer's perception of the risks of vaccines while decreasing perceived benefits of vaccines (Witteman and Zikmund-Fisher, 2012). These results can lead to a conclusion that search engines lead searchers to information that can be seen as anti-vaccination and this exposure can then decrease the viewer's perception of the benefits of vaccines.

Conclusion

As a result of the 10-week Google search and discourse analysis of other sources, this project parallels the findings of other studies that both pro-vaccination and anti-vaccination perspectives are quick and easy to access via the Internet. The interaction with both sides of the debate likely causes confusion for viewers, leading to the need for further research. The fact that patients are getting more involved in their own healthcare decisions creates an atmosphere where information is shared between other patients and between medical professions. This information interaction creates an atmosphere where patients are less reliant on medical professional opinions. The vaccine debate is a fight between two groups within

society using both science and technology claims. Technology, specifically the Internet, allows for society to interact directly with science meaning science has to interact directly with society. This creates a need for scientists to be able to report their information in terms that the mass majority of people are able to interpret.

This research uses five categories to determine the overall message that the 100 websites encountered portrays to viewers. Each category is slightly different ranging from completely pro vaccination to completely anti vaccination with a mix in between. The pro websites work to present facts and research findings showing no link between vaccines, their ingredients, or the timelines that they are administered on to autism. These websites are blunt in their statements that no link exists and that vaccines are a safe and necessary part of the promotion of public health. Meanwhile, the anti vaccination websites work much harder to attempt to discredit the claims of the pro vaccination side of the debate. The anti websites use tactics such as reporting on conspiracy theories like the CDC hiding information and making a mockery out of a pop culture attempt to show children what autism is like through the new Sesame Street character. The anti websites are not as blunt in their statements about a link, rather they use terms like possible, believed, suspected, and some when reporting their claims.

This research aimed to replicate the previously conducted research as a means to update the information. This research found similar results to Davies and colleagues study in that half of the websites encountered through a basic search engine share information that is not entirely pro-vaccination. Drawing connections with Witteman and Zikmund-Fisher's study it can be concluded that by encountering websites that 50% of the time present information that is not completely pro-vaccine an Internet searcher is decreasing their chances of perceiving the

safety of vaccines and increasing their chances of perceiving the risks of vaccines. It is clear that because there is still so much information on the Internet both for and against vaccines the debate continues today. It is not easy to decipher accurate from inaccurate information on the Internet when there is so much information contradicting each claim. The appeals that both sides make can be emotional in addition to being presented in a factual manner. Many of the pro-vaccine websites exist merely as sources working to debunk all the claims on the anti-vaccination websites. But this effort to rebuttal the other side leads to websites that wind up fitting into the in-between categories, those that are not fully for or against vaccines.

Overall this research supports previous findings. It also furthers our understanding by joining information for multiple studies and analyzing for links between them. The vaccine debate will likely continue indefinitely or until a definitive cause is found for autism that all sides can agree on. This debate is the prime example of how when people seek out more information, in the world of the Internet, they often find many results. It further illustrates that more information and improved access to that information does not necessarily lead to better decision making, but rather leads to confusion and need for additional research because so much information exists on the Internet. It is as if one must decide he/she is done researching before a decision can be made because there is no way to read every bit of information out there and still come to decision without confusion.

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