



A postmodern Pandora's box: Anti-vaccination misinformation on the Internet

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ABSTRACT

The Internet plays a large role in disseminating anti-vaccination information. This paper builds upon previous research by analyzing the arguments proffered on anti-vaccination websites, determining the extent of misinformation present, and examining discourses used to support vaccine objections. Arguments around the themes of safety and effectiveness, alternative medicine, civil liberties, conspiracy theories, and morality were found on the majority of websites analyzed; misinformation was also prevalent. The most commonly proposed method of combating this misinformation is through better education, although this has proven ineffective. Education does not consider the discourses supporting vaccine rejection, such as those involving alternative explanatory models of health, interpretations of parental responsibility, and distrust of expertise. Anti-vaccination protestors make postmodern arguments that reject biomedical and scientific “facts” in favour of their own interpretations. Pro-vaccination advocates who focus on correcting misinformation reduce the controversy to merely an “educational” problem; rather, these postmodern discourses must be acknowledged in order to begin a dialogue.

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1. Introduction

With morbidity and mortality from vaccine-preventable diseases [VPDs] having reached record lows [1], vaccines are one of the most successful tools for biomedical science and public health. Yet paradoxically, the effectiveness of vaccination has led to the re-emergence of anti-vaccination sentiments. Vaccines may be seen as unnecessary or dangerous because incidence rates of VPDs in developed countries have plummeted. Vaccine “reactions” – negative health events following vaccination, attributed to the vaccine – then appear to be more common than the diseases themselves [2]. In this way, vaccines can be considered victims of their own success.

The media plays a large role in disseminating and sensationalizing vaccine objections. Such objections are part of what has been called the “anti-vaccination movement”, which has had a demonstrable impact on vaccination policies, and individual and community health [3]. A common sequence to vaccination scares involves scientific debate about potential vaccine risks, which communication technology transmits via a rhetoric of doubt; parents incorporate this with personal experiences and spread their views to their social groups [4]. These social groups exert considerable pressure on vaccination decisions by creating a “local vaccination culture” [5]. With the prominence of the Internet in today's world,

the attitudes, beliefs, and experiences of that local culture can quickly become global.

Internet usage statistics show approximately 74% of Americans and 72% of Canadians are online [6]. An estimated 75–80% of users search for health information online [7]. Of these users, 70% say the information they encounter online influences their treatment decisions [8]. In 2006, 16% of users searched online for information on immunizations or vaccinations [9]. While online research is more convenient and accessible than reading medical literature or visiting health practitioners, too great a reliance on Internet-based information can be problematic. Over half (52%) of users believe “almost all” or “most” information on health websites is credible [8]; yet the availability of inaccurate and deceptive information online has labelled the Internet a “modern Pandora's box” [10]. The nature of the Internet allows any and all opinions to spread widely and instantaneously. Individuals and groups gain exposure online without being filtered or reviewed – and anti-vaccination advocates have taken advantage of this fact. Anti-vaccination messages are more common on the Internet than in other forms of media, increasing the likelihood that vaccination decisions may be based on misleading information [11]. Indeed, parents who exempt children from vaccination are more likely to have obtained information from the Internet than parents who have their children vaccinated; they are also more likely to have used certain anti-vaccination websites [12]. This demonstrates the importance of understanding what messages are presented online and why they may be accepted.

The body of research examining online anti-vaccinationism is not large, nor has there been a recent update [11,13–18]. Only

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Table 1
Presence of content criteria on analyzed anti-vaccination websites.

Website analysis criteria	n	%
<i>Content attributes</i>		
<i>Safety and effectiveness</i>		
<i>Poisons</i> : Vaccines contain poisons/toxins/contaminants	8	100
<i>Idiopathic illnesses</i> : Vaccines cause illnesses of unknown origin (e.g. autism, AIDS)	8	100
<i>Immunity</i> : Vaccines erode immunity, create only temporary/ineffective immunity	7	88
<i>Simultaneous vaccinations</i> : Multiple vaccines at once increase adverse events	3	38
<i>“Hot lots”</i> : Supposedly contaminated vaccine lots have more adverse events	3	38
<i>Underreported</i> : Vaccine reactions are underreported	5	63
<i>Disease decreases</i> : Disease incidences declined without vaccines (i.e. from improved hygiene)	7	88
<i>Trivial diseases</i> : Vaccine-preventable diseases are uncommon/not contagious/relatively mild	4	50
<i>Alternative medicine</i>		
<i>Alternative treatments</i> : Promoting treatments superior to vaccination (e.g. homeopathy)	7	88
<i>Critiquing biomedicine</i> : Established medical knowledge is wrong (e.g. germ theory is untrue)	6	75
<i>Implied debate</i> : Suggesting debates over if vaccination is effective/necessary	3	38
<i>“Back to nature”</i> : Promoting “natural” approaches (e.g. children should get diseases naturally)	7	88
<i>Products for sale</i> : Promoting alternative products (e.g. vitamins, essential oils)	1	13
<i>Civil liberties</i>		
<i>Parental rights</i> : Civil liberties violated by taking away parental choice	6	75
<i>Monitoring</i> : Vaccine programs harass parents who do not vaccinate	2	25
<i>Totalitarianism</i> : Vaccine mandates are excessive government control	5	63
<i>Conspiracy theories/search for truth</i>		
<i>Profit</i> : Vaccination policies motivated by profit	6	75
<i>Collusion</i> : Vaccine promoters benefit from illnesses caused by vaccines	5	63
<i>Protection</i> : Government protects doctors/manufacturers from liability	4	50
<i>Cover-ups</i> : Vaccine information withheld from the public	6	75
<i>Rebel doctors</i> : “Enlightened” doctors break away from the medical establishment	4	50
<i>Foolish doctors</i> : Doctors are ignorant, fearful of sanctions	2	25
<i>Fear-mongering</i> : Dangers of diseases exaggerated to frighten parents	4	50
<i>Unusual theories</i> : Unique theories about purposes of vaccination (e.g. sterilization)	3	38
<i>Privileged knowledge</i> : Presenting information the medical world is unaware of/rejects	4	50
<i>Anti-science</i> : Biomedicine is wrong; other ways of “knowing” (i.e. intuition, instinct)	3	38
<i>Informed choices</i> : Encouragement to make educated decisions for oneself/one's children	3	38
<i>Morality, religion, and ideology</i>		
<i>Religious tenets</i> : Vaccination is against God's will	2	25
<i>Immoral acts</i> : Vaccination involves immoral acts (e.g. child experimentation)	3	38
<i>Anti-utilitarianism</i> : Universal vaccination sacrifices a few to benefit many	1	13
<i>Misinformation and falsehoods</i>		
<i>Outdated sources</i> : Sources cited are outdated, have been disproven	6	75
<i>Misrepresentations</i> : Sources not used truthfully, false conclusions drawn	7	88
<i>Self-referencing</i> : Links/references to anti-vaccination “experts”	7	88
<i>No references</i> : No statistics/citations provided to support claims	3	38
<i>Falsehoods</i> : Unsupported statements made	7	88

one analysis [13] examined misinformation and deception on such sites, but was not quantitative. Prior research also acknowledged the need to understand discourses underlying anti-vaccination arguments [19,20], but did not elaborate upon them. This analysis aims to address these issues by answering two main questions. First, what information is proffered on anti-vaccination websites, and what is its accuracy? Second, what discourses make these vaccine objections appealing?

2. Methods

2.1. Data collection

Web searches were conducted on May 21, 2009 using the terms “vaccine”, “vaccination”, and “immunization OR immunisation” input into [Google.com](#) (the American version of the search engine) and [Google.ca](#) (the Canadian version). Google was chosen as it is the most popular search engine, accounting for 73% of all Internet searches [21]. Results were classified as anti-vaccination and included for content analysis if they opposed childhood vaccination for any reason, without meeting any of the following

exclusion criteria: (1) listserv or newsgroup pages; (2) pages solely containing brief notices about other website content; (3) news results, medical journals or library sites; (4) video results; (5) book previews; (6) non-English sites; (7) sites exclusively about adult immunization; (8) sites exclusively about veterinary vaccination and (9) inactive links. Criteria (see [Tables 1 and 2](#)) were applied to the anti-vaccination websites and coded as present or absent. Criteria were adapted from previous online anti-vaccination studies [11,13,14,17,18], as well as created by the author.

Online health information seekers examine the first 10 search results 97.2% of the time [22]; therefore, only the first 10 results retrieved per term were examined. Of 30 total [Google.com](#) results, 5 of 21 immunization sites (24%) were classified as anti-vaccination. Of 30 total [Google.ca](#) results, 2 of 16 immunization sites (13%) were classified as anti-vaccination. To amass additional websites for a more meaningful study, the Canadian searches were extended to 50 results per term. Of 150 total results, 5 of 86 immunization sites (6%) were classified as anti-vaccination (two were duplicates of American results). Combining the American and Canadian results, 8 anti-vaccination websites were subjected to content analysis. [Appendix A](#) lists the sites analyzed.

Table 2
Presence of design criteria on analyzed anti-vaccination websites.

Website analysis criteria	n	%
<i>Design attributes</i>		
<i>Emotive appeals</i>		
<i>Personal testimonies</i> : Stories about harmed children/personal experiences	7	88
<i>Victim imagery</i> : Pictures of harmed children	4	50
<i>Needle imagery</i> : Pictures of scary needles	1	13
<i>Us vs. them</i> : Adversarial themes (e.g. a parent's love vs. science)	4	50
<i>Responsible parenting</i> : Making decisions for child's best interests	4	50
<i>Content aspects</i>		
<i>Non-partisan claims</i> : Site alleges to present both sides of the issue	2	25
<i>Unbiased</i> : Site actually presents both sides	1	13
<i>Negative links</i> : Links to anti-vaccination sites present	8	100
<i>Positive links</i> : Links to pro-vaccination sites present	4	50
<i>Status</i> : Implying authority/official status	2	25
<i>Exemptions</i> : Information for legally avoiding immunizations present	4	50
<i>Adverse reporting</i> : Information for reporting adverse reactions present	2	25
<i>Attorneys</i> : Links to attorneys provided	2	25
<i>Commercialism</i> : Vaccine critical books, tapes, etc., for sale	6	75
<i>Solicitations</i> : Asking to support website/anti-vaccine cause	5	63

3. Results

3.1. Proportion of anti-vaccination websites

The proportions of pro- and anti-vaccination sites found per search term are illustrated in Fig. 1. Overall, American searches returned more anti-vaccination results (24%) than Canadian searches (6%), indicating American parents are more likely to encounter anti-vaccination sites via Google than are Canadian parents. Neither search engine returned any anti-vaccination results for “immunization OR immunisation”; this was expected based on research that found anti-vaccination groups avoid using the term “immunization” as they tend not to believe that vaccines confer immunity [16]. Although prior studies returned more search results [11], this does not necessarily mean the number of anti-vaccination websites has decreased, but rather that their search rankings may have shifted. Nevertheless, the proportion of sites retrieved for some search terms is notable – 71% of results from the Google.com “vaccination” search were classified as anti-vaccination.

3.2. Content and themes

Fig. 2 illustrates the percentage of analyzed sites with the listed themes present. Individual content criteria are quantified in Table 1. Individual design criteria are quantified in Table 2.

3.2.1. Safety and effectiveness

“Vaccines are biological poisons, harmful to health, and a contributing factor in childhood illness.” (<http://www.vaclib.org/sites/debate/about.html>)

Safety themes were present on all anti-vaccination websites analyzed. Every site claimed vaccines are poisonous and cause idiopathic illnesses. Sites stressed that vaccines contain substances poisonous to humans, including anti-freeze, ether, formaldehyde, mercury, and nanobacteria. Pertinent information was not elaborated upon – for instance, that the amount of potentially harmful substances in vaccines is not enough to produce toxic effects in humans, or that ether does not refer to the anaesthetic but to a chemical compound. Illnesses attributed to vaccines included:

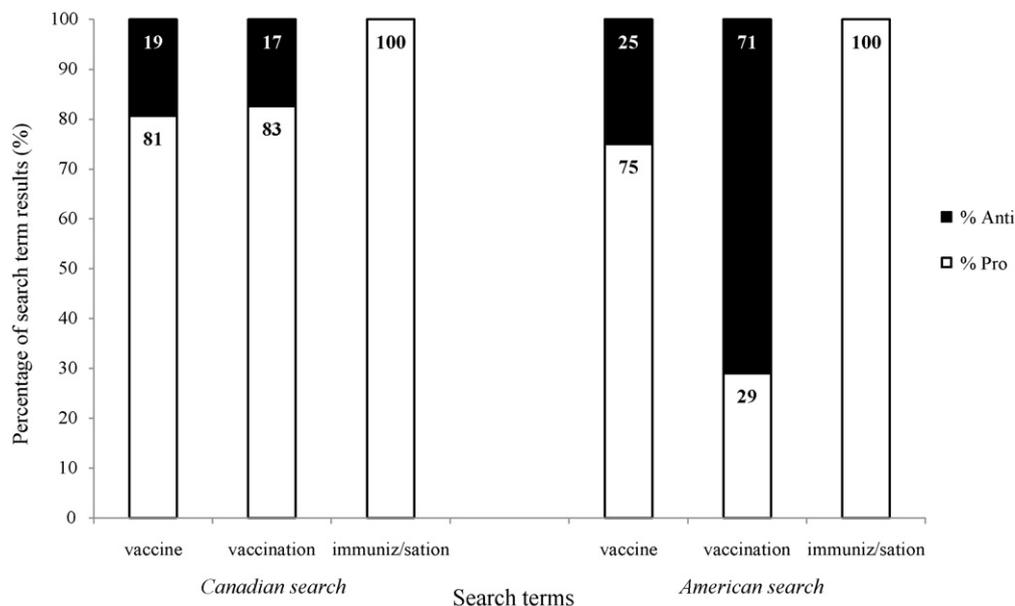


Fig. 1. Proportion of pro- and anti-vaccination websites returned per search term from American and Canadian Google searches.

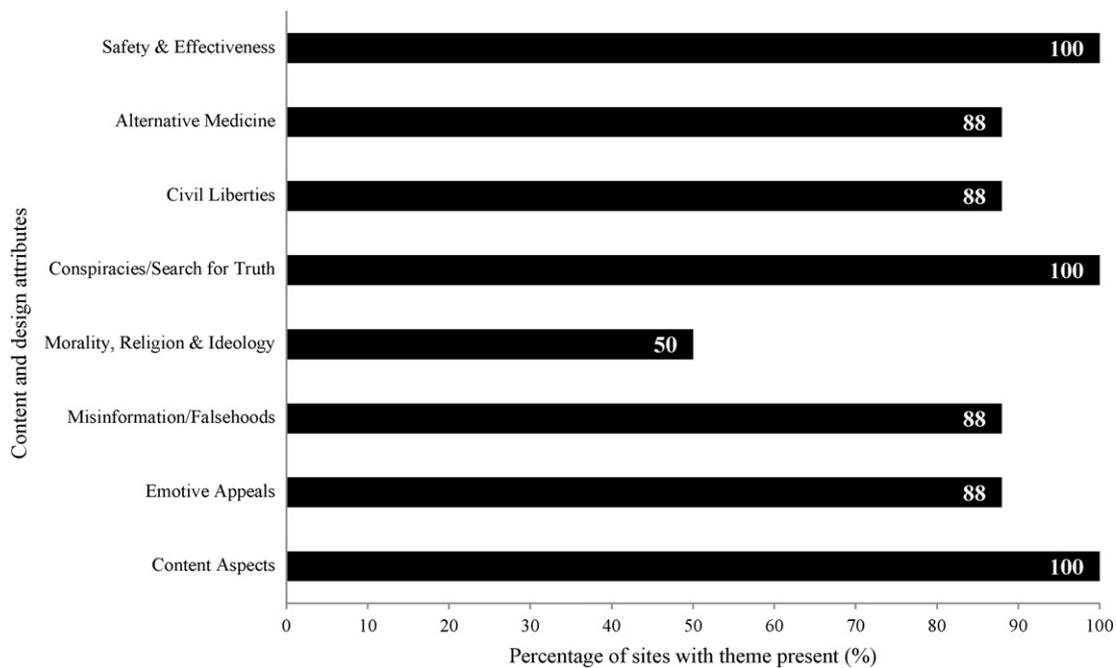


Fig. 2. Percentage of anti-vaccination websites analyzed with content and design attributes present.

AIDS, asthma, autism, cancers, diabetes, fibromyalgia, leukemia, lupus, Sudden Infant Death Syndrome, and many more. Studies showing no link between vaccines and illnesses such as autism [23] were ignored.

Questioning whether vaccines actually conferred immunity was also common (on 88% of sites). This included propositions that vaccination weakens the immune system, or that immunity is ineffective because vaccinated individuals still contract diseases. Many websites (88%) pointed to decreases in disease levels occurring before mass immunizations; credit was given only to improvements in sanitation, nutrition, and poverty levels. Some websites (38%) suggested “hot lots” of vaccines were associated with more injuries; one site was selling a list of suspicious lot numbers for \$25.

Half the websites asserted that VPDs are trivial. One website described smallpox as “harmless under proper treatment [...] And not considered deadly with the use of homeopathy [...] And it certainly didn't appear to be that infectious, if infectious at all” [24]. Another site maintained that infections such as measles improved a child's health, pronouncing, “the symptoms do not constitute the disease but the cure” [25]. Serious complications of VPDs were not acknowledged – for example, that in developed countries, 1 in 1000 children with measles develop encephalitis and 1–2 in 1000 die [26].

3.2.2. Alternative medicine

“Just because you give somebody a vaccine, and perhaps get an antibody reaction, doesn't mean a thing. The only true antibodies, of course, are those you get naturally.” (<http://www.whale.to/vaccines/antibody.html>)

Many anti-vaccination websites promoted alternative medicine. Most (88%) endorsed treatments such as herbalism, homeopathy, chiropractics, naturopathy, and acupuncture as superior to vaccination. This was linked to the idea of moving “back to nature” (on 88% of sites), where natural methods of disease prevention were preferable – this included breastfeeding, eating whole foods, and allowing children to experience illnesses naturally. Critiques and suspicions of biomedicine were present on 75% of sites. Most common were arguments against Louis Pasteur's

germ theory – websites contended that diseases resulted from imbalanced bodily conditions and lifestyle choices rather than from microorganisms. Some staged *ad hominem* attacks against Pasteur, claiming he plagiarized his theory.

Anti-vaccination websites tended to reject scientific, clinical, and epidemiological studies demonstrating the safety and efficacy of vaccines. Pro-vaccination studies were criticized as unreliable, conducted by those with vested interests in vaccination. One website commented, “Today's ‘science’ seems to be much less scrupulous than in earlier times” [27].

3.2.3. Civil liberties

“No one has the moral or ethical right to compel parents to vaccinate their children against the parents' wishes – not the doctors, not the schools, not the government at any level.” (http://www.vaccinationnews.com/Scandals/2008/Feb_26.08/Scandal87.htm)

The most common civil liberties criterion present was that of parental rights (on 75% of websites), which were seen as being infringed upon by not letting parents choose how to care for their children. This included describing stories of parents who had their children taken away by social services after learning they had not been immunized. Accusations of totalitarianism were made by 63% of websites. This included warnings that citizens were being prepared for draconian measures in the event of a pandemic. Monitoring was mentioned on 25% of sites, with complaints that immunization records were used to harass parents who did not vaccinate.

3.2.4. Conspiracy theories/search for truth

“M.D.s [sic] invented the term sudden infant death syndrome to explain away the ‘coincidence’ that babies die about the same time they receive vaccines.” (<http://www.vaccination.co.uk/Information/Questions/tabid/56/ItemId/4/Default.aspx>)

The conspiracy theory theme was present on every website analyzed. Most sites (75%) made accusations of a cover-up, where regulatory bodies purportedly have information about vaccines

they are hiding from the public. Equally as common (75%) were suggestions that vaccination is motivated solely by a quest for profit. Allegations of collusion were present on 63% of websites, where pharmaceutical companies and physicians were accused of benefiting from vaccine reactions as harmful side effects keep them in business. Similarly, 50% of websites were suspicious that governments protect vaccine manufacturers and doctors from possible harms caused by vaccines. One site quoted that, “Asking the CDC to look into vaccine safety is like asking the fox to guard the chicken coop” [28].

Half the websites analyzed applauded doctors who spoke out against vaccines. Often cited was the study by Wakefield et al. [29] – considered the origin of the modern vaccine controversy – which suggested a link between autism and the measles–mumps–rubella [MMR] vaccine. Andrew Wakefield was portrayed as a martyr, enduring “character assassination and professional shunning” [30]. Not mentioned was that the study’s findings were discredited and retracted by the other authors, that Wakefield faces charges of professional misconduct, and that he is accused of having falsified his data [31]. As for pro-vaccination doctors, 25% of sites suggested they are too afraid to speak out, are in denial that they could be harming children, or are ignorant as to the true nature of vaccines.

Unusual theories were propounded by 38% of sites, including that vaccines contain birth control to sterilize populations or genetic information to create new pandemics. Some websites (50%) claimed to possess privileged knowledge – for example, using massive amounts of Vitamin C to prevent anthrax or crib death. They chastised the medical establishment for ignoring such wisdom. The biomedical community was also criticized using anti-science rhetoric (on 38% of sites). Sources of knowledge such as personal intuition were promoted, while biomedical information was portrayed as erroneous; parents were urged to not to allow biomedical fear-mongering to overshadow their own instincts. The notion of “informed choice” was promoted by 38% of websites. Sites insisted they were not against parents choosing to vaccinate their children, so long as their decision was based upon proper information from both sides of the debate. However, the information they provided tended to be one-sided.

3.2.5. Morality, religion, and ideology

“Immunization [...] necessitates the belief that it is acceptable to sacrifice a few for the good of the majority.” (<http://vran.org/legacy/docs/VRAN-Immunization-Fact-Sheet-v6.pdf>)

The theme of morality, religion, and ideology was the least common content theme. Only 25% of websites argued against vaccination based on religious tenets – for example, being created in God’s image means receiving God’s perfect immune system. Only one website rejected the utilitarian basis for vaccination, arguing that vaccinating to protect society was not justifiable. Mentioning immoral acts was most common (on 38% of sites). This included associating vaccines with morally dubious actions, such as: viruses being cultured in the tissue of aborted fetuses; animals being tortured in the process of vaccine manufacturing; and experimenting on children in developing countries when testing vaccines.

3.2.6. Misinformation and falsehoods

“Attenuated vaccine viruses are infectious, therefore they infect the recipients [sic] cells... [and] have the potential to be transmitted... through generations.” (<http://www.vaccination.co.uk/Information/Questions/tabid/56/Itemid/4/Default.aspx>)

Misinformation and falsehoods were not quantified by previous studies of anti-vaccination websites, but this analysis found misinformation to be widespread. Vaccine studies were often misrepresented (on 88% of websites). This included drawing false

conclusions from research, using sources untruthfully, and describing data very selectively. For example, statistics were quoted demonstrating that the majority of people contracting VPDs were those who had been vaccinated, implying that vaccination is ineffective. Further statistics, such as the high rates of unvaccinated individuals who contract VPDs, were not included for comparison. Misleading statements were made, such as, “Sweden banned the pertussis vaccine in 1979, and yet Sweden now has the second lowest infant mortality rate in the world” [28]. The implication is that vaccination is unnecessary. Not clarified was that Sweden merely switched from whole cell pertussis vaccines to the acellular form [32].

Many websites (88%) made claims unsupported by evidence, including that: smallpox is not contagious (but rather spread by bedbugs); autism is caused by “stealth viruses”; and polio is caused by sugary foods (as the disease was more prevalent in summer, and thus linked to increased ice-cream consumption). One site questioned whether rabies was a psychosomatic manifestation rather than a viral disease, and recommended against vaccinations when bitten by wild animals.

The only website without any evidence of misinformation was the “Vaccine controversy” Wikipedia page. In some situations Wikipedia’s accuracy may be suspect, for any user can modify pages at will; however, in this case its open nature appears to have acted as a form of peer-review, keeping the page current, unbiased, and properly referenced. There appears to be no internal self-criticism within the anti-vaccination community [13]; this was demonstrated by most of the analyzed websites, where questionable statements contrary to established medical opinions went unchallenged. In comparison, because both opponents and proponents of vaccination had access to the Wikipedia page, it was the most credible and balanced of all the websites examined.

3.2.7. Emotive appeals

“Parents and doctors must choose responsibility to living children over avoiding guilt about children who have died.” (http://www.vaccinationnews.com/Scandals/2003/Jan_31/Feb_07/Scandal54.htm)

Personal testimonies were the most common emotive appeals used (on 88% of sites). The majority were narratives from parents who felt their children were damaged by vaccines. Half of websites included the notion of “us versus them”, where concerned parents and vaccine objectors were portrayed as battling physicians, governments, corporations, or the scientific establishment. Pleas were made by 50% of websites for parents to be responsible and make decisions in the best interests of their children – avoiding vaccination was portrayed as the best way to do so.

3.2.8. Content aspects

“Reporting ALL SIDES Of The Vaccination Controversy!!” (<http://www.vaccinationnews.com/>)

The websites analyzed included information on legal vaccine exemptions (on 50% of sites), reporting adverse reactions (25%), and finding attorneys specializing in vaccine injuries (25%). One site offered online “classes” about vaccine dangers. One-quarter of sites implied official status, labelling themselves as non-profit or public education groups. One-quarter labelled themselves as non-partisan sources of information presenting both sides of the debate, but while 100% contained links to other anti-vaccination websites, only 50% contained links to pro-vaccination sites. One site prefaced pro-vaccination links with, “Samples [sic] sites of how Vaccines are made to sound Necessary and Okay” [33].

4. Discussion

The websites examined demonstrated the use of numerous anti-vaccination themes. Of particular interest in this analysis was the use of misinformation, which had not been previously quantified. Every website save one contained arguments against vaccination that could be considered disingenuous. A proponent of vaccination would likely wish to counter with the “correct” information; indeed, the most commonly proposed intervention to combat vaccine misinformation is education. Using a vaccination metaphor, one suggestion has been to “immunize” parents against anti-vaccination arguments through proactive vaccine promotion [16]. While acknowledging falsehoods is important, the assumptions behind educational methods must be examined.

Assuming additional information will influence vaccination decisions reduces the issue to one in which two sides are separated only by a gap in information [34]. Educational campaigns may portray those in opposition as ill-informed, overly emotional, irrational, or anti-rational [35], further antagonizing those contesting vaccination. Attempts to provide the “correct” information have not been effective, demonstrated by both research [36] and anti-vaccination advocates suing challengers for libel [37]. Historical evidence also illustrates that education has been unsuccessful. Vaccination protests emerged alongside modern vaccinology in the 18th century [38–46], and have changed little over time [47]. Historical protest methods included emotional appeals emphasizing parental devotion, denouncing germ theory, accusing medical professions of duplicity, and alternative analyses of data to portray vaccination as ineffective. Common themes included worries over safety, encroachments on individual rights, distrust of scientific authority, advocating “natural healing”, promoting sanitary reform, disbelief in theories of contagion, and alleging monetary motivation as the driving force behind immunization. These themes and methods all persist today, observable on each website analyzed, despite the increased medical and scientific knowledge available to counter such claims.

That these protests have endured over time indicates the presence of broader social and political tensions [41,48]. Historically, the debates centred mostly on civil rights and government distrust in relation to compulsory vaccination. While such arguments are still made, they are less common today than other themes, with the current focus broadening to critiques of medicine, science, and authority. The present debate occurs in the context of postmodern society, which is especially conducive to such protests. This is because the characteristics of postmodernism include concerns about values, prioritizing risk over benefit, and promoting the well-informed patient [49]. These characteristics correspond to the three main themes of discourse extracted from the websites analyzed: belief in alternative models of health, promotion of parental autonomy and responsibility, and suspicions of expertise. These discourses help create a framework in which vaccine decisions are made – understanding this framework can illuminate why anti-vaccination ideals may be embraced.

4.1. Alternative models of health

Vaccination may be rejected based on different “explanatory models” of health and disease [50]. A biomechanical view of the body, where symptoms are caused at the molecular level, may not be as appealing as recognizing physical and spiritual aspects of health and well-being [51]. For instance, a common metaphor describing the immune system involves schooling, where immune cells “learn” to identify harmful cells; vaccinations are a form of “public education”, “crash courses” for cells [52]. Some parents avoid vaccination in favour of “private schooling” – tutoring their child’s immune system through diet, exercise, and healthy

lifestyles. Rather than “resisting” vaccination, these parents instead develop a more positive view of health through rejecting the biomedical metaphor of battling invaders. This was demonstrated by websites advocating terrain theory, proposing that disease is caused by improper physiological balance within the body rather than by germs; this allows for not only a greater sense of control over health, but also more holistic acknowledgement.

However, not all who refuse vaccination do so because they desire spiritual and physical integration. Some are suspicious of biomedicine, and actively resist its global dominance over other medical systems. Adhering to alternative models of health can be an indication of protest against pervasive medicalization [4]. This was demonstrated by numerous websites criticizing biomedicine as dogmatic, authoritarian, and untrustworthy.

Postmodern thought has changed the medical system. Evidence-based decision-making has refined opinions into separate components: opinions = evidence + values [49]. While pro-vaccination advocates may feel they have evidence supporting their opinion, objectors’ values cannot be discounted for they help determine if an opinion is worth holding. For some, opposing vaccination may be less about vaccines themselves than about embracing health explanations more compatible with their concerns, whether holism or resistance to hegemonic practises.

4.2. Parental autonomy and responsibility

Many websites stressed the importance of parents educating themselves about vaccination options. This entreaty is designed to encourage parental autonomy, urging them to take charge of their children’s health rather than turning it over to others. This exemplifies the paradigm of shared decision-making, where patients are active partners in making healthcare decisions rather than passive recipients of advice from doctors [53]. Today’s healthcare rhetoric gives legitimacy to informed choice, encouraging people to be critical consumers responsible for their own health [35]. Consumers strive to be knowledgeable and empowered – it is only logical for this critical view to extend to vaccination. Some websites portrayed this process of education as more important than the eventual vaccination decision, for through acquiring knowledge parents become “free thinkers” and achieve personal responsibility.

While vaccination may be promoted as having societal as well as individual benefits, the notion of responsibility relates primarily to one’s own child. Parents may reject epidemiological and population-level risk arguments for vaccinations, for such statistics do not take into account specific experiences, ideologies, and health histories. Many mothers consider their child’s immune system to be unique and therefore not appropriate for the recommended vaccination schedule [54]. These objectors likely take their responsibilities as parents seriously, but interpret risks and benefits from a more personalized point of view. Indeed, many websites had testimonials from parents focusing on possible vaccine risks over benefits from disease prevention; for them, the risks associated with a concrete action (i.e. vaccination) seem more salient than the risks associated with an abstract disease threat. This contradicts the common portrayal of vaccine exemptors willingly putting their children in danger.

4.3. Trust and expertise

Accusations of conspiracies were present on every anti-vaccination websites analyzed. Given this lack of trust, providing more “education” will be ineffective. The fact that some vaccine criticism comes from within the scientific community – Wakefield’s MMR paper [29], for instance – reinforces public distrust of scientific support. Vaccine anxieties may not result from objections to particular policies or institutions, but from the debate’s back-and-

forth antagonism that likely contributes to suspicions of “expert systems” [55].

The postmodern perspective questions the legitimacy of science and authority. Traditional controversy dynamics, with “audiences” needing to be “educated” by “experts”, no longer apply [56]. Confidence in the power of expertise has sharply decreased; appeals to experts are often considered manipulative. Despite this, making decisions without citing expertise often makes groups vulnerable. This was demonstrated on numerous analyzed websites – anti-vaccination advocates criticized pro-vaccination studies for being faulty or having conflicting interests, yet anti-vaccination studies (to which the same criticisms could be applied) were accepted unquestioningly. Despite censuring scientific knowledge, anti-vaccination groups appealed to science to bolster their case.

The notion of expertise is not static, but continually re-established [56]. Yet this reestablishment can fail, and expert knowledge may be treated as part of the problem. Redefining expertise is seen within the vaccination debate, where objectors oppose medical “experts” attempting to sway them; instead, linking to the notion of parental autonomy, parents make themselves the authority on what care their children need. In postmodern society, the Internet as the dominant medium has “blown away the doors and walls of the locked library” [49]. With the large number of self-styled experts online, even the most respected vaccine authority’s advice becomes just another opinion [57]. Everybody can be considered an expert to some extent [58]. Therefore, appealing to scientific and medical authorities is not as convincing as it once was.

5. Conclusion

This analysis detailed the many arguments proffered on anti-vaccination websites. On such sites, misinformation was pervasive. While this may be considered the principle obstacle to vaccination, providing better education has not been effective. Many “hard-core activists” are not persuadable [15], no matter the amount of information provided. For this reason, more consideration must be given to the social discourses underlying anti-vaccinationism – reasons for refusing vaccines may involve alternative understandings of health, different perspectives of parental responsibility, or questioning the legitimacy of traditional authorities. These discourses exemplify postmodern tensions in society, making the anti-vaccination issue one of significant complexity.

This analysis was limited by the transient nature of the Internet, where websites addresses and search rankings constantly change. Furthermore, the Internet is borderless; while this study analyzed only the original websites retrieved, hyperlinks can instantly access other sites, including those very influential within the anti-vaccination community that were not retrieved by the original Google searches. A possible explanation for this is that neutral search terms were used – queries such as “vaccine injuries” or “vaccines and autism” would likely retrieve higher proportions of anti-vaccination results. These results are therefore not exhaustive, but do exemplify the template of themes commonly broached by vaccine objectors. Indeed, they echo the fears currently being raised regarding the 2009 H1N1 swine flu vaccine [59].

Postmodernism does not accept one source of “truth” – a philosophy adopted by the anti-vaccination movement. Vaccine objectors reject the “facts” presented to persuade them towards vaccination; for the anti-vaccination movement, “mis”information is simply their version of information. The Internet acts as a postmodern Pandora’s box, releasing arguments that are not easily dismissible. Misinformation and falsehoods should not be condoned, yet each side of the debate labelling the other as “wrong” – as has been the status quo – is ineffectual. Combating vaccine misinformation with

education is necessary, but not sufficient [35]. Greater appreciation of the discourses underlying anti-vaccinationism is needed in order to understand the ideologies that support such beliefs. This would be a fruitful avenue for future social science research, for it is through better understanding that a more relevant and less accusatory dialogue on the topic can then begin.

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Appendix A. Anti-vaccination websites analyzed

Global Research.ca – <http://www.globalresearch.ca>

Vaccination – <http://www.vaccination.co.uk>*

*website (homepage only) now archived at <http://web.archive.org/web/20080610121307/http://www.vaccination.co.uk/>

Vaccination Debate – <http://www.vaccinationdebate.com>*

*website now hosted at <http://www.vaclib.org/sites/debate/index.html>

Vaccination Liberation – <http://www.vaclib.org>

Vaccination News – <http://www.vaccinationnews.com/>

Vaccine controversy – Wikipedia, the free encyclopedia – http://en.wikipedia.org/wiki/Vaccine_controversy

VRAN: Vaccination Risk Awareness Network – <http://www.vran.org>

WHALE – Vaccine website – <http://www.whale.to/vaccines.html>

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