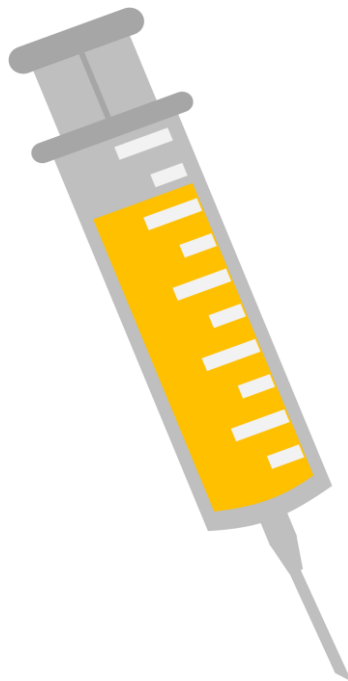


Guido Blijleven

Vaccine critical websites in the Netherlands

An analysis of content and design aspects found on Dutch vaccine critical websites, compared to websites from other cultures.



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MSc Thesis

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Summary

Background: Vaccine hesitancy has become a problem: vaccination coverage has been declining for three consecutive years in the Netherlands. Low vaccination coverage can cause outbreaks of diseases such as the measles. While historically there have been population that had low vaccination coverage, such as the orthodox protestants, a group of 'anti-vaxxers' has emerged, characterized for doing their own research, leading them to vaccine critical websites.

Objective: The objective of this study is to gain an understanding of the content and design elements present on Dutch vaccine critical websites, and to compare these results with websites in other languages.

Methods: Twenty unique Dutch vaccine critical websites were identified using several search queries in the Google search engine. The websites were analyzed for their contents and design aspects, coding them as either present or absent. The results of the Dutch websites are compared to results of English and French websites analyzed in previous studies.

Results: All Dutch vaccine critical websites contained claims regarding the safety and effectiveness of vaccines. Claims that vaccines cause idiopathic illnesses such as autism were, or that vaccines contain poisons were the most common. About half the websites alluded to alternative methods of medicine than vaccination. Research on vaccination that produced pro-vaccination results were often critiqued, stating that the methods were flawed. Conspiracies regarding vaccination were a major theme across websites, accusing the government and pharmaceutical companies of colluding against citizens, covering up evidence of vaccines causing adverse effects and claiming that vaccines are merely made for profit and not with the health of citizens in mind.

Conclusion: Most results of Dutch websites were comparable to those of English and French websites, however, the importance of conducting your own research was a sentiment found on many websites. Dutch websites carried this sentiment more than English or French websites. This is in line with more recent trends among anti-vaxxers. Further research of vaccine critical websites in other cultures could help determine if claims made by anti-vaxxers are culturally dependant, or different.

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1. Introduction

1.1. Readers guide

Though the last major outbreak of a vaccine preventable disease in the Netherlands occurred years ago, vaccination, and the population that does not vaccinate, is currently a *hot topic* in the Netherlands. Many news articles appeared in the period between August and October 2018, with headlines such as: "Less vaccinations, more measles in Europe" (NOS 2018, translated), three days later: "Vaccinations losing popularity: Cabinet wants measures taken" (NOS, 2018, translated). In this thesis, we take a closer look at vaccine criticism, specifically, criticism on the internet. The introduction provides background information for the problem, as well as an overview of previous studies on the topic of vaccine criticism on the internet. After, several theories that help us understand vaccine hesitancy and the way vaccine critical websites influence visitors of these websites are discussed. Then the methods are explained, followed by the results of the study. The thesis ends with a discussion of the results and a reflection of theory and methods.

1.2. Vaccine coverage

The invention of vaccinations is widely considered to be one of the most important advances in public health. Mass vaccination programs have caused diseases such as mumps or polio to decline spectacularly in incidence, worldwide. Worldwide vaccination programs caused deaths due to measles to drop by 85% between 2000 and 2016 (WHO, 2018), and deaths from polio have decreased by 99% since 1988 (WHO, 2018). The Netherlands has a vaccination program called the National Immunization Program (NIP), which is monitored by the Dutch National Institute for Public Health and the Environment (RIVM). Vaccinations for children in the Netherlands are free of charge and voluntary. By having a large portion of a population immunized, those who are unable to get a vaccination, due to a compromised immune system for example, can still be protected. This phenomenon is called herd immunity, and is one of the reasons why having a high immunization coverage is important (Anderson & May, 1985). Getting a vaccination does not mean that one is fully protected from getting a disease, especially if an individual is in prolonged contact with those who carry the disease. A high vaccination coverage, however, keeps diseases from spreading. For many vaccine preventable diseases, the immunization coverage needed to prevent an outbreak requires over 90% of the population to be vaccinated (Anderson & May, 1985). Other, more contagious diseases require even higher immunization rates.

While vaccination coverage in the Netherlands is still high for newborns, the rate has dropped for the third consecutive year. For children born in 2015, 90.2% received a full coverage of vaccines after two years, compared to 91.2% of children born in 2014 (Van Lier et al, 2018). To illustrate the ill effects of decreasing immunization rates one can find examples in measles outbreaks. In 2018 there have been several large outbreaks of the measles in European countries such as Italy and France, and to a lesser extent in other countries like Belgium, Norway and Germany (Van Lier et al, 2018). Measles require an immunization rate of 95% or more to minimize chances of an epidemic. The vaccination for measles is included in the MMR vaccine (mumps, measles & rubella). The MMR vaccine is administered to children when they reach the age of 14 months. Out of the children born in the Netherlands in 2015, 92.9% have received their MMR vaccination, considerably less than the

previous cohort (93.8%) and even worse than the 2010 cohort (96.1%) (Van Lier et al, 2018). Besides the Netherlands, other European (22/29) countries have not reached the optimal rate of >95%, making the population vulnerable to measles outbreaks. The last reported measles outbreak in the Netherlands dates back to 2013/14, with around 30.000 cases (Woudenberg et al, 2017), with a total cost of almost four million Euros (Suijkerbuijk et al, 2015).

1.3. Historic resistance against vaccination

While vaccines can be considered hot topic right now, resistance to vaccines is as old as the first vaccine itself (Dubé, Vivion & MacDonald, 2015). In the Netherlands, too, there have always been traditional groups that have refused vaccines. Fournet et al. (2018) reviewed 48 articles and identified five under-vaccinated groups (UVG's) in Europe that have historically had low vaccination coverage, or experienced outbreaks of vaccine preventable diseases since 1950. The five groups discovered were orthodox protestant communities, anthroposophist communities, Roma, Irish travelers, and orthodox Jewish communities. Two of the groups are particularly interesting, as they suffered from outbreaks of vaccine preventable diseases within the Netherlands. These are the Orthodox Protestant Communities (OPC from here on) and the Anthroposophist Community (AC from here on). The OPC make up around 1.5% of the Dutch population, concentrated in the "bible belt" (see Figure 1) (Fournet et al, 2018). Estimates of the size of the AC, who hold a spiritual and mystical philosophy based on the teachings of Steiner, is lacking, the community suffered from a measles and mumps outbreaks in 2008 (Karagiannis et al, 2008; Van Velzen et al, 2008). Fournet et al, (2018) reviewed the reasons behind vaccine refusal within these groups. The AC and OPC have differing reasons for refusing to vaccinate, and these reasons differ within the populations as well. To summarize, vaccines do not confer with the philosophy and view of a healthy lifestyle for the AC and the OPC places belief in divine protection rather than vaccines.

Last year, there was an uptake in the vaccination coverage among the OPC in the Netherlands. (RIVM, 2017). An increase of 15%, from 40% to 55% has been noted. The RIVM has no data available about the immunization coverage of the anthroposophist community. It is remarkable that even though the traditional UVG has seen an increase in immunization coverage, the immunization coverage in the Netherlands as a whole has decreased in the same time period. The RIVM (2017) states in their surveillance and developments paper about the NIP that they have yet to find an explanation for the decrease in the immunization coverage. The decrease has not been exclusive to a specific geographic area, but is spread throughout the country.

MMR Vaccination coverage in the Netherlands per region (RIVM, 2018)

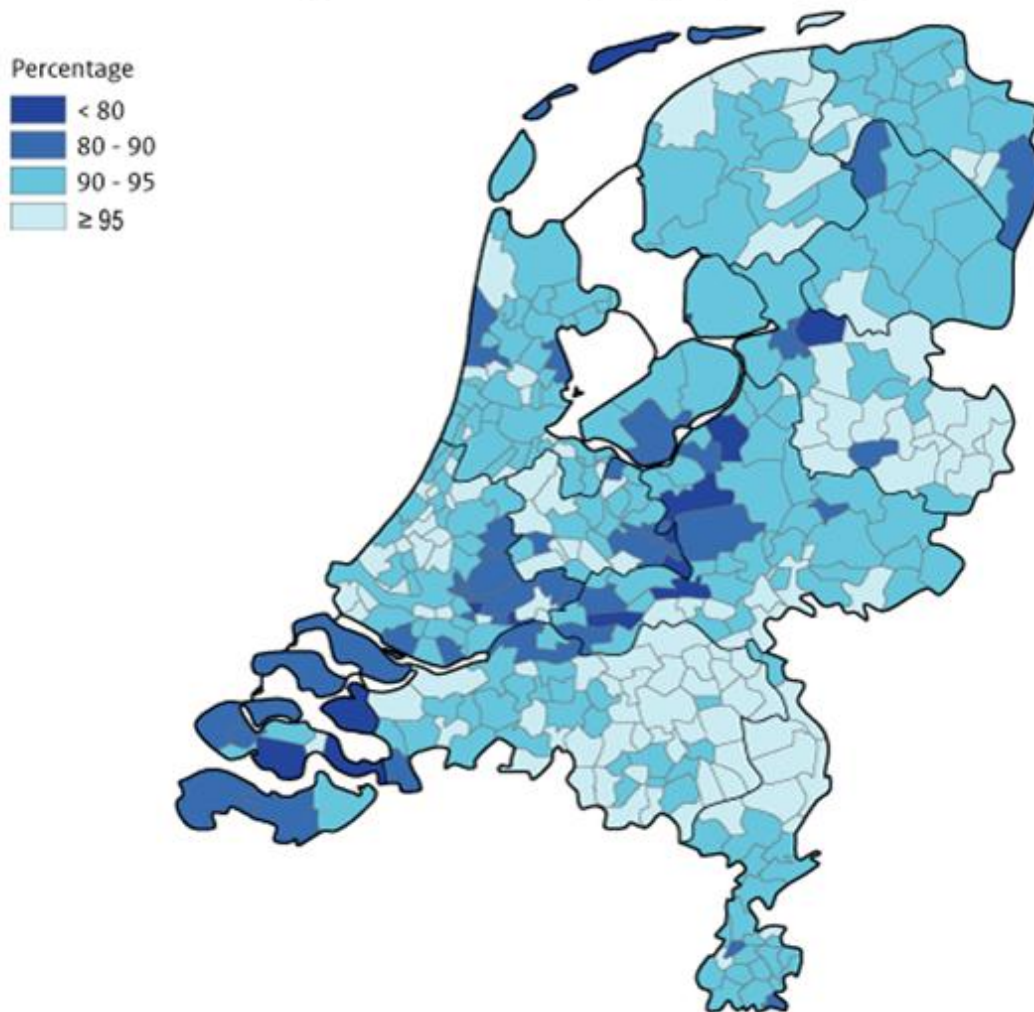


Figure 1: Vaccination in the Netherlands by region (RIVM, 2018)

1.4. Modern "anti-vaxxers"

In comparison to the traditional groups refusing vaccines, the modern day parent reluctant to vaccinate is referred to as an "anti-vaxxer", and can be characterised as highly educated, middle- or upper-income class and well informed in the sense that they conducted their own research on the topic (Dubé, Vivion & MacDonald, 2014). While high education was found to be associated with vaccine acceptance, there are studies that associate higher education with vaccine refusal (Larson et al, 2014). It should also be noted that modern day opponents of vaccines market themselves differently than traditional groups: rather than being "anti-vaccine", they refer to themselves as pro-safe vaccines or pro- informed decisions regarding vaccines (Kirkland, 2012), refraining from the stigma associated with being anti-vaccine. Modern opponents of vaccination are often very active on online news forums, generating proportionally more anti-vaccination content than those who accept vaccines create pro-vaccine content (Pereira et al, 2011).

Negative content is more often shared online than positive experiences. When vaccination has no negative consequences for an individual, they have little incentive to share said experience. In contrast, the sharing of doubts, or negative experiences is more likely to happen (Stahl et al, 2016).

Anti-vaccination groups and lobbyists use the internet actively to spread their messages and narratives. An example of this phenomenon can be found in the claim that vaccines cause autism. The claim came from an article published in 1998 in the Lancet by Andrew Wakefield, in a paper linking the mumps, measles and rubella (MMR) vaccine to autism (Wakefield et al, 1998). While the claim has been proven false, the article has been retracted, and Wakefield is accused of falsifying data, the claim that vaccines cause autism can still be found on most vaccine critical websites (Kata, 2010).

A study by Betsch et al, (2010) revealed that viewing vaccine-critical websites for five to ten minutes increases perceptions of risks of vaccination, and decreases the perceived risk of not getting the vaccination. The intention to vaccinate decreases as more information from the vaccine-critical website is consumed. A study among undergraduate students by Nan & Madden (2012) that examined the impact of exposure to blogs about the human papillomavirus (HPV) vaccine on attitudes and risk perceptions of vaccines found that people viewing negative blogs perceived vaccines as less safe and had more negative perceptions compared to a control group. Viewing a positive blog did not alter perceptions or attitudes compared to a control group.

Kata (2010) argues that the internet, and specifically vaccine criticism on the internet, has entered the postmodern era. With information widely available on the internet, the locus of power concerning health information has shifted from doctors to the patient. Patients are constructed as consumers of information on the internet, their choices no longer restricted by "experts". In the post-modern world it can be argued that everyone is an "expert". This is paired with suspicion and mistrust of traditional authority and powers, and science. Laymen, or consumers, can find their own information from sources challenging expert systems (Kata, 2010).

The internet is for a large part unregulated territory. In principle, anyone can construct a website containing any kind of information, including information about health. It is understandable that without proper regulation and quality control, websites may contain mistruths, false facts or outdated information (Kata, 2012). While reported ill effects caused by misinformation on the internet is scarce, the potential for poor-quality health information to cause serious harm is enough to raise concern.

1.5. Studies of vaccine critical websites

Several studies investigating what exactly is being shared on vaccine critical websites have been conducted. Most of these studies examined websites written in English (Kata, 2010; Wolfe et al, 2002; Bean, 2011) and one study examined French websites (Ward et al, 2015). The first study that examined the claims present on vaccine critical websites was that by Wolfe, Sharpe and Lipsky (2002). In their study they analysed 22 unique websites, where they coded attributes related to vaccine criticism as either present or absent. The eleven content attributes and ten design attributes used in their study were based on common claims made by opponents of vaccination, and were adapted from a study of printed anti-vaccination material. Wolfe, Sharpe & Lipsky (2002) found that the most common claims regarding vaccines used on vaccine-critical websites were that vaccines cause idiopathic illnesses, vaccines erode immunity, adverse reactions to vaccines were supposedly underreported and that policy regarding vaccines was largely motivated by profit. These claims were accompanied by design features such as the providing of links to other vaccine critical sites, and emotional stories of children and parents struck by negative effects allegedly caused by vaccination. A later study, conducted by Kata in 2010, built further upon the research of Wolfe et al (2002). In her study, Kata (2010) took a broader approach to the problem of anti-vaccination. She divided the claims of anti-vaxxers into different themes and expanded on the list of Wolfe et al. The use of misinformation on vaccine critical websites were studied as well by Kata (2010).

Bean (2011) contributed to the existing body of research on vaccine critical websites with the aim to compare the content, design and credibility themes of websites with the results of earlier studies to examine if these changed over time. Bean (2011) found that vaccine critical websites are constantly changing in response to trends and events that happen, as well as the success of vaccination. The first study of vaccine critical websites in a language different than English was conducted by Ward et al, (2015). This was interesting because this made it possible for results to be compared between cultures to see if there are differences, or if claims on websites are universal.

1.6. Problem statement & Research question

Vaccine coverage has been declining for the past three years in the Netherlands, which is potentially harmful if this trend continues. Vaccine critical websites are seen as a driver behind an increasing vaccine hesitancy in many parts of the world (Kata, 2012; Betsch et al, 2011), though it is uncertain to what extent these websites influence vaccine coverage in the Netherlands. Although a body of research on vaccine critical websites exists, with thorough analysis of the content found on these websites, most of the websites analysed were in English and French, while research of websites in other languages is lacking. An analysis of content found on Dutch websites is completely lacking, and it is of yet unknown what can be found on Dutch vaccine critical websites. Content found on websites may vary between cultures, as found by the research of Ward et al, (2015) where differences were found between French and English settings. It is important to gain an understanding of the arguments used by anti-vaxxers, and discover if the claims they make are universal, or culturally specific. Furthermore, Dutch policymakers tasked with tackling the problem of vaccine hesitancy can benefit from knowing the arguments and claims being presented by Dutch vaccine critics, so they don't have to rely on research based in other countries, where cultural differences may affect the claims made by anti-vaxxers.

Besides researching cultural differences, it is important to keep up with the content presented on anti-vaccination websites in general, as they are not static, but rather constantly adapting to changes in the environment (Bean, 2011), therefore it is possible that content found on current vaccine critical websites has changed. Previous research studying vaccine critical websites did not use a theoretical framework through which to view the results of their studies. The current study does make use of a theoretical framework and analyses the appropriateness of the theory in relation to the content and design elements found on vaccine critical websites.

This study will focus on the Dutch setting, emulating the experience of a person looking for information on vaccines, and researching the content and design attributes found on Dutch vaccine critical websites. Besides using the same keywords in the search query as previous studies, new keywords will be used based on the four major content themes that emerged from the previous studies. As people use these keywords in their search, the chances of encountering vaccine critical websites should increase. By collecting data on the Dutch setting, the findings of the previous research can be compared on 1) differences and similarities between cultural settings and 2) changes over time in vaccination arguments, adding to the framework of content and design elements used by vaccine critical websites.

As the decisions to vaccinate is partly determined by the information available and many people use the internet to look up said information, it is important to gain an overview of the results that one is faced with. For policymakers and public health professionals it is important to have an understanding of the content that is presented to those who are searching for information on vaccines. Especially when websites are critical of vaccines, as viewing these for only little amounts of time can impact the perception of vaccines negatively (Betsch et al, 2011).

Objective

The aim of this study is to chart and understand the content provided on Dutch anti-vaccination websites, and to compare this to settings in another cultural context. Based on this research, new insights could be drawn on what vaccine critical content exists in Dutch culture, and how vaccine critical content differs between countries and cultures. Existing strategies to tackle vaccine hesitancy can be changed to better fit the critique found on vaccine critical websites, making this research useful in tackling the declining vaccination coverage in the Netherlands.

Research question

In order to answer the problem discussed in the introduction, the following research question has been formulated:

What content and design elements are used on vaccine critical websites in the Dutch language, and how does the content & design of Dutch vaccine critical websites compare to websites analysed in other cultural settings?

Sub questions:

- A. How often, and how high on the search page, do vaccine critical websites show up when searching for information on vaccines using Google?*
- B. What content is presented on Dutch vaccine critical websites?*
- C. What design elements are used on Dutch vaccine critical websites?*
- D. How do the content and the design elements found on Dutch vaccine critical websites compare to the content and design elements found on vaccine critical websites in other cultural settings?*

2. Theoretical framework

2.1. Readers guide

The theoretical framework sheds light on vaccine hesitancy and the causes of it, using the three C's model. The way vaccine critical websites affect the reader is explained using a psychological model of vaccine decisions, as well as the elaboration likelihood model. Then the content and design attributes used on vaccine critical websites are discussed presented. Finally the theory is linked to one another.

2.2. Vaccine hesitancy

While there are many factors influencing vaccine coverage, an increase in vaccine hesitancy has been dubbed as one of the causes of the declining vaccine coverage (Dubé et al, 2013). Vaccine hesitancy has been put on the agenda by the European Parliament, as many countries have increasing worries about the phenomenon (RIVM, 2017). The Strategic Advisory Group of Experts (SAGE), part of the WHO, formed a working group on immunization and vaccine uptake in order to tackle vaccine hesitancy. In 2014, SAGE published a report in which the concept of vaccine hesitancy was defined:

“Vaccine hesitancy refers to delay in acceptance or refusal of vaccines despite availability of vaccination services. Vaccine hesitancy is complex and context specific varying across time, place and vaccines. It includes factors such as complacency, convenience and confidence.”

Within the spectrum ranging from total acceptance to complete refusal of vaccines, vaccine hesitancy describes those who fall in the middle, often agreeing on some vaccines while refusing others. In the SAGE definition, complacency refers to the low perceived risks of vaccine-preventable diseases, regarding the vaccine as unnecessary. Convenience refers to the physical availability, affordability and the ability to understand the immunization services. Confidence is about trust in the vaccine, regarding the effectiveness and safety of the vaccine, the system delivering the vaccine, and the motivation of the policymakers involved with the vaccine (WHO, 2014).

The SAGE definition of vaccine hesitancy uses the "3C"s model (see figure 2). The model groups factors affecting vaccine hesitancy into three distinct categories; confidence, complacency and convenience. It is possible for factors to have an overlap between two, or three groups, hence the choice for a Venn diagram for the model. Confidence in this model refers to trust in 1) the effectiveness and safety of vaccines, 2) the system delivering vaccines and 3) the motivations of policymakers deciding on the needed vaccines. For example, distrust in the pharmaceutical industry may affect the decision to vaccinate and lead to vaccine hesitancy. In general, the type of person that has low confidence in vaccines holds strong negative attitudes towards them, sometimes formed due to misinformation (Betsch et al, 2015).

Vaccine complacency comes to existence when the perceived risks of vaccine preventable diseases become low. Because the perceived risks are low, vaccination is no longer seen as a necessary preventative action. The success of a vaccination programme can paradoxically cause complacency, as the incidence of vaccine preventable diseases decline, the perceived risk of the disease goes down with it. Protective behaviour is less likely to occur when a minimum level of threat is not reached (Betsch et al, 2015). Complacent people have low involvement with vaccination, in other words, they do not care about it.

The last component, convenience, describes the effect that the physical availability of vaccines, the affordability, the willingness-to-pay, the ability to understand (language and health literacy) may have on vaccine hesitancy. Betsch et al, (2015) note that the intention-behaviour gap, a common phenomenon in psychology where an intention to do something may not always lead to the execution of the intention, should be considered when looking at convenience. Even though people may find vaccination important, (personal) issues that arise can be seen as more important, leading to a delay or refusal of vaccines. Another example of an issue regarding convenience is that people can become confused about the vaccine schedule, missing the dates and therefore putting it off.

Cases exist in which vaccination coverage is low due to system failure, such as a natural disaster happening or a plain lack of available vaccines. Within these cases vaccine coverage cannot be taken as a measure of vaccine hesitancy, even though hesitancy can be present there, the focus would be on the system (WHO, 2014).

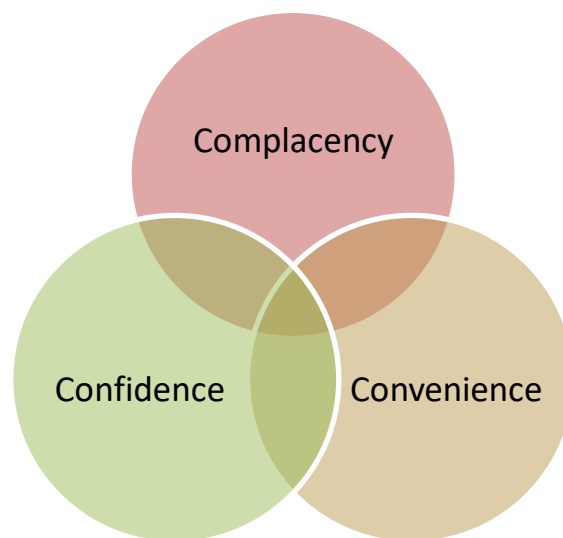


Figure 2: Complacency, Confidence & Convenience model of vaccine hesitancy (WHO, 2014)

There is some criticism on the model of SAGE, arguing that while it was an important and meaningful step towards a model of vaccine hesitancy, additional sources of information need to be utilized for an adequately informed model (Larson et al, 2014). Noting that vaccine hesitancy is a complex issue driven by context-specific factors, Larson et al, (2014) address the need for more data from under-represented countries.

A paper by Betsch et al, (2015) recognize the limits of the three C's model, and propose a fourth C to the model: Calculation. Calculation refers to the rational process, or calculation, that an individual undergoes in decision making. Betsch et al, (2015) speak of calculation when an individual engages in an extensive information search for the pros and cons of vaccination, and weighs these to form a subjective expected utility of vaccination. For calculation, the information one comes across when searching for information is key.

2.3. Psychological Model of Vaccine decisions

The decision to vaccinate is a complex process, determined by many factors. To understand the way in which vaccine behaviour is affected by information found on the internet, a psychological model of vaccine decisions can be used. Betsch (2011) describes the process leading to the decision to either vaccinate or not in three phases (see Figure 3). Looking at the three phases described in the psychological view by Betsch, it can be linked to the 3C's model.

In the first phase, the pre-selectional phase, the problem is identified. In this case the options for individuals to vaccinate are considered. One can either vaccinate within the time schedule as prescribed by the government (NIP in the Netherlands), delay their vaccinations or refuse to take them. Most individuals in this phase choose to follow the time schedule of the government. It is also in this phase, that people will gather the necessary information to be informed on the decision to vaccinate. The internet has become a popular source of information, though it is not the only one, as health professionals and friends or family may for example also be consulted (Van der Belt et al, 2013). Betsch (2011) argues that due to the popularity of the internet as a source of information, it holds an influential role on the decisions made regarding vaccination. The first phase, where information search is key, relates mostly to confidence and complacency of the 3Cs model. Considering the content found on vaccine critical websites, it is entirely possible for an individual to come across information that affects aspects of confidence in vaccines when visiting a vaccine critical website. Many sites argue that vaccines cause adverse effects. the pharmaceutical industry is rotten, or that the government engages in a cover up regarding negative vaccine news. These three examples of arguments frequently used by vaccine critical websites (Kata, 2010; Bean, 2011; Ward et al, 2015) are considered in the three pillars of confidence. The information may also lower the perceived risks of vaccination, which can cause complacency to occur.

In the second phase, the selectional phase, individuals evaluate the possible outcomes of their actions, in this case to vaccinate or not. A balance is made of the information that was gathered in the pre-decisional phase, to make a decision. In this balance the risks and benefits of vaccination are weighed against one another. The entire processing of the information of vaccine critical websites can be considered as calculation, the C that was added to the three C's model by Betsch (2015). The following example illustrates the effect a vaccine critical website may have on an individual. Betsch (2011) explains that people must perceive themselves as being at risk before taking protective action, such as vaccinating. If a person has viewed a vaccine critical website, it is possible that the perception of the risks associated with vaccine preventable diseases has gone down, and the perception of the risks associated with getting a vaccine has gone up (Betsch, 2010; Nan & Madden, 2012). So by viewing vaccine critical websites, people may become complacent, which is one of the key areas of the three C's model. Other factors, such as having no firsthand experience with the diseases vaccinated for, and the ability to free-ride vaccinations' herd immunity may also be considered in the decision making process. Of course, the internet also has the ability to influence to decrease the perceived risks of vaccination, though the effects are less than vaccine-critical websites (Nan & Madden, 2012).

In the third phase, the post-decisional phase, the behaviour ((not) vaccinating) has taken place, and the individual evaluates their experience. Unlike the previous two phases, this phase is not easily linked to the three C's model. Though, when receiving feedback it is entirely possible that the experience will be shared with others, for example through the comment section of a website, or as

an article for a website. Interesting here, is that a negative experience with vaccination is far more likely to be shared on the internet with others, than a positive experience with no adverse effects (Kata, 2012), causing somewhat of an imbalance of the shared information. This shared experience can in turn affect the pre-selectional phase and risk-perception of others. The information acquired in each phase is stored in the memory and will influence future decisions.

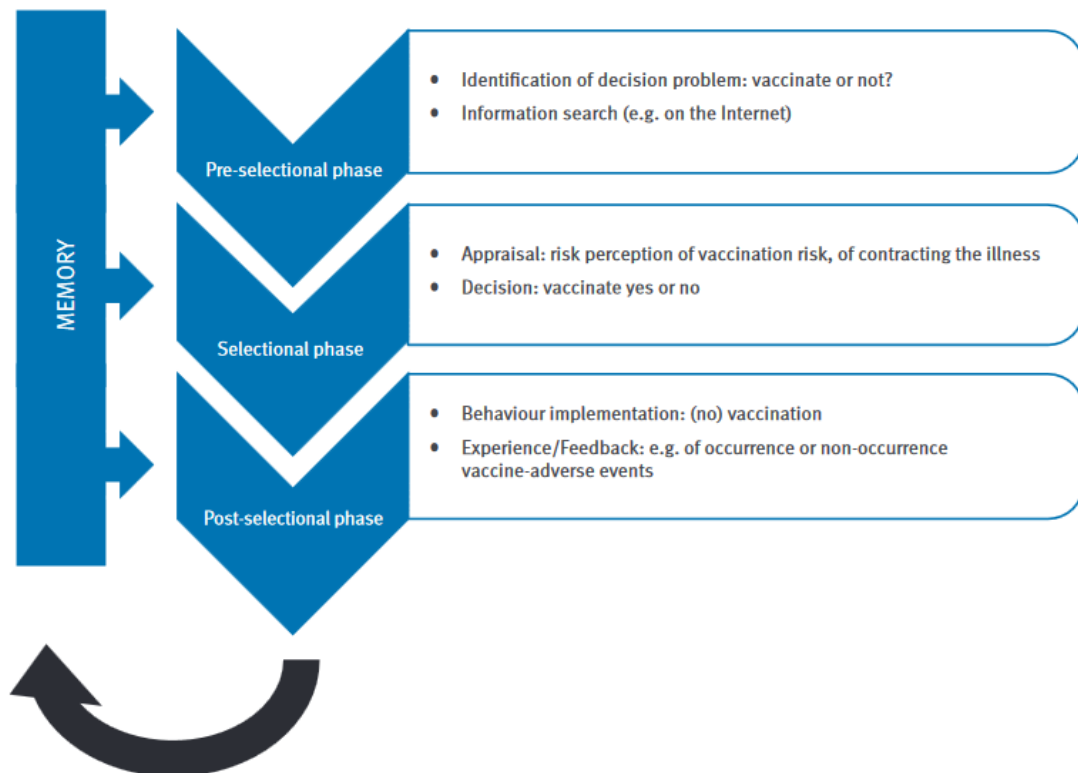


Figure 3: Psychological view of vaccine decisions. Betsch (2011)

2.4. Elaboration Likelihood Model

To gain more insight in the way that websites may influence consumers, the elaboration likelihood model may be used. The model was developed by Petty & Cacioppo (1986) as a model to explain persuasion processes in mass media. In the model, elaboration is the extent a person critically thinks about the arguments relevant to an issue. Elaboration can be seen as a continuum, where on the one hand no or little thought is given to the issue at hand, to the other end where the issue and arguments about the issue are thoroughly examined and thought out (Petty & Cacioppo, 1986). The model is a "dual processes" model, and considers two routes that information may travel when influencing attitudes: the central route and the peripheral route. Processes in the central route require attention and cognitive thinking. People that are highly motivated to process information relevant to the topic are likely to follow the central route. When motivation to process information is low, the peripheral, or indirect, route is more likely used. This route requires little to no active thinking, and attitudes formed throughout this route are mostly based on heuristics.

People searching the web for health related information are more likely to be highly motivated to process information (Goh & Chi, 2017), as they are already actively thinking about the subject, making them more likely to be using the central route when examining online information. Even so,

the peripheral route still plays an important role in the persuasion of those looking for online information. Goh & Chi (2017) stress the importance of the two routes forming a joint process, rather than two separate routes. In their study of Chinese forum users discussing the rotavirus online, both routes were of importance in the construction of arguments.

Relating the Elaboration Likelihood Model to vaccine critical websites, the assumption can be made that the central route is important for the consideration of the effects of the content attributes, where the argument requires elaboration. The design attributes of vaccine critical websites relate more to the peripheral route, where imaging and looks influence attitudes more easily. Both processes are important when considering the influence of the internet on vaccine behaviour.

2.5. Content & Design attributes

With an understanding of how the internet may influence vaccination related behaviour, it is necessary to chart what content and which design elements are actually present on vaccine critical websites.

Data collected by previous research of vaccine critical websites can be divided into three domains. First, there is *content*, which is the main focus of most studies. Content consists of claims that are made on vaccine critical websites, for example, the claim that vaccines cause autism, would be considered a content aspect. Content attributes should be considered when talking about influencing attitudes and behaviours via the central route (SanJosé-Cabezudo et al, 2009). Secondly, there are *design* attributes to websites. Here, the focus is on the way that the information on vaccine critical websites is presented. An article about vaccination could for example include a picture of needles, or provide links to other vaccine critical websites. The design attributes in general influence the consumer via the peripheral routes (SanJosé-Cabezudo et al, 2009). Last, there are *credibility* attributes. Websites could be biased in the way information is presented, or misrepresent results of research.

The first list of attributes used to analyse vaccine critical websites was used by Wolfe et al, (2002) and are based on a paper by Leask & Chapman (1998) who analysed vaccine critical claims in print media, before vaccine critical websites existed. They used 11 common claims as content attributes, such as "vaccine cause idiopathic illnesses" and "vaccine policy is motivated by profit" in their research, and coded these as either present or absent on websites. Later research by Kata (2010), expanded on these attributes and made a list consisting of 31 content attributes. Kata (2010) increased the amount of attributes by specifying themes that Wolfe et al, (2002) only touched upon by using one attribute. Kata (2010) divided the list of content attributes into six distinct themes. The first being safety and effectiveness, which includes attributes such as "idiopathic illness" and "immunity", covering claims about vaccines causing autism and other disorders and vaccine eroding the immunity, respectively. Most attributes (8 out of 11) of Wolfe et al, (2002) fit in within this theme. Secondly, she added themes for alternative medicine, civil liberties, conspiracies / the search for truth, morality, religion and ideology, and misinformation and falsehoods.

Bean (2011) modified the list of Kata (2010), most notably transforming the misinformation and falsehoods theme into the domain of credibility, while adding new attributes into this domain. The credibility domain lists attributes that are concerned with the 'fairness' of a website, for example if the information presented is current, questions if the provided information is well sourced, or if there are any misrepresentations of data. Another striking difference is the absence of morality,

religion and ideology in her list, though no reason why this is the case is given. The rest of the list of Bean (2011) is very similar to that of Kata (2010), with few other modifications.

Ward et al, (2015) use 24 attributes in their research. Their list of attributes is similar to that of Kata (2010) and Bean (2011), though there are some major differences. First, the theme of civil liberties has not been used in their research. Second, the theme of conspiracies has been rebranded to 'trust in authorities and medical recommendations', doing away with some attributes in that section, though keeping the same spirit. Third, Ward et al, (2015) did not use the domain of credibility, and used only a few attributes that Bean (2011) had in that domain. It should also be noted that they, in contrast to Bean (2011), used the theme of morality, though reframed it to philosophical arguments against vaccination.

Overall, the lists by Kata (2010), Bean (2011) and Ward et al, (2015) are very comparable, and form an improvement over the list of attributes made by Wolfe et al, (2002). I would argue that Kata's list is the most relevant for this research, as it is the most complete list of attributes, with the exception of the credibility domain. The credibility domain is not used in this thesis, as the researcher lacks the time to verify the credibility attributes in that domain. This makes the list of Kata (2010) the one that will be used in this thesis, and can be found in table 1.

Table 1: List of content and design attributes, with explanations. Based on previous studies by Kata (2010), Bean (2011) and Ward et al, (2015).

Content attributes

Safety and effectiveness

- Poisons: vaccines contain poisons/toxins/contaminants
- Idiopathic illnesses: Vaccines cause illnesses of unknown origin (e.g. autism)
- Immunity: Vaccines erode immunity, create only temporary / ineffective immunity
- Simultaneous vaccinations: multiple vaccines at once increase adverse events
- "Hot Lots": supposedly contaminated vaccine lots have more adverse effects
- Underreporting: vaccine reactions are underreported
- Disease decreases: Disease incidences declined without vaccines
- Trivial diseases: vaccine-preventable diseases are uncommon/ not contagious / relatively mild

Alternative Medicine

- Alternative treatments: promoting treatments superior to vaccination (e.g. homeopathy)
- Critiquing biomedicine: established medical knowledge is wrong
- Implied debate: suggesting debates over if vaccination is effective/neccessary
- Back to nature: promoting "natural" approaches
- Products for sale: promoting alternative products

Civil Liberties:

- Parental rights: civil liberties violated b taking away parental choice
- Monitoring: Vaccine programs harass parents who do not vaccinate
- Totalitarianism: vaccine mandates are excessive government control

Conspiracy Theories/Search for truth

- Profit: vaccination policies motivated by profit
- Collusion: Vaccine promoters benefit from illnesses caused by vaccines
- Protection: government protects doctors/manufacturers from liability
- Cover-ups: vaccine information withheld from the public
- Rebel doctors: "Enlightened" doctors break away from the medical establishment
- Foolish doctors: doctors are ignorant, fearful of sanctions

- Fear-mongering: Dangers of diseases exaggerated to frighten parents
- Unusual theories: Unique theories about purposes of vaccination
- Privileged knowledge: presenting information the medical world is unaware of / rejects
- Anti-science: biomedicine is wrong: other ways of "knowing".
- Informed choices: encouragement to make educated decisions for oneself/one's children

Morality, Religion, and Ideology

- Religious tenets: vaccination is against God's will
- Immoral acts: vaccination involves immoral acts
- Anti-utilitarianism: universal vaccination sacrifices a few to benefit many

Design Attributes

Emotive appeals

- Personal testimonies: stories about harmed children/personal experiences
- Victim imagery: pictures of harmed children
- Needle imagery: pictures of scary needles
- Us vs Them: adversarial themes (e.g. a parents love vs science)
- Responsible parenting: making decisions for child's best interests

Content aspects:

- Negative links: links to anti-vaccination sites present
- Positive links: Links to pro-vaccination sites present
- Status: implying authority / official status
- Exemptions: information for legally avoiding immunizations present
- Adverse reporting: information for reporting adverse reactions present
- Attorneys: links to attorneys provided
- Commercialism: vaccine critical books, tapes, etc., for sale
- Solicitations: asking to support website / anti-vaccine cause

2.6. Connecting the content and design attributes to theory

The integrated theory is presented in table 2. Here, the areas of the three C's model have been connected to the themes of the content and design elements, as well as the processing route from the elaboration likelihood model.

All attributes within the Safety & Effectiveness can be categorised as an issue of confidence when relating it to the three C's model. The attributes within this theme deal with claims regarding the safety of the vaccines, aimed at decreasing the trust in the safety and effectiveness of vaccines. There are two exceptions, however. "Disease decreases" and "Trivial Diseases" both fall into the category of complacency, as these impact the perceived threat of the vaccine preventable diseases rather than the vaccine itself.

For the theme of Alternative Medicine, both complacency and confidence are of importance. Believing that there is a viable, or even superior alternative for vaccination can be categorised as causing complacency. The critique of biomedicine and the implied debate over the effectiveness of vaccines, however, could be considered as an issue of confidence, as it undermines confidence in the system that delivers vaccinations.

Both the Civil Liberties theme and the Conspiracy theme contain claims that are attacking the system delivering the vaccines as well as the motivation of the vaccine manufacturers, thus falling into the confidence part of the three C's model. Complacency can also be considered, because the issue of

vaccine merely being made for profit is brought up. This implies that vaccines are not made to protect from diseases, meaning that the importance of vaccination may decrease.

Having moral objections to vaccination, for example believing that it is against the will of God, is not properly covered in the three C's model. An argument could be made that it is covered under convenience, with an inherent disagreement over the morality of vaccination, though there is no literature supporting this.

The design aspects are harder to relate to the three C's model, as some of the contents within these themes are not directly related to vaccines, but rather say something about the credibility, or objectivity of a website. Within the design attributes, the content aspects are not related to the three C's model. However, the emotive appeals relate mostly to issues of confidence. The telling of personal stories where adverse reactions to vaccines or the system delivering the vaccines is used to lower the confidence people have in vaccines. The same can be said about imagery of needles and harmed children.

Table 2: Integration of theory. On the left side the themes present on vaccine critical websites, on the right side the categories they fall into

Theme	Three C's model	Elaboration
Safety & Effectiveness	Confidence Complacency	Central route
Alternative medicine	Confidence Complacency	
Civil Liberties	Confidence	
Conspiracy & Search for the truth	Confidence Complacency (minor)	
Morality, Religion & Ideology		
Emotive Appeals	Confidence	Peripheral route
Content Aspects		

3. Methods

3.1. Readers guide

In paragraph 3.2. the keywords that form the search queries are presented, and the methods for the selection of websites are discussed. Paragraph 3.3. discusses the methods used for the data extraction and analysis.

3.2. Website selection

To gather websites for analysis, multiple search queries have been formulated. The query was based on previous research (Wolfe et al, 2002; Kata, 2010; Bean, 2011; Ward et al, 2015), as shown in table 3. These queries were translated and used in the current study. In addition, several new queries have been formulated based on the contents commonly found on vaccine critical websites, as well as queries based on the Dutch context. For example, "vaccinatie complot" was used to illustrate the theme of conspiracies, and "kritisch vaccineren" was used in relation to the Dutch context, where the main anti-vaccination organisation (NVKP) uses "kritisch" in their name. A total of fourteen search queries have been formulated and used.

Table 3: Keywords used for search query

<i>Authors of previous studies</i>	<i>Keywords used in previous study</i>	<i>Translated keywords, used for the current study</i>
<i>Wolfe et al (2002)</i> <i>Bean (2011)</i>	<i>vaccine, vaccinate, vaccination, immunize, immunization, immunise, immunisation, anti-vaccination, anti-immunization, and anti-immunisation</i>	Vaccin, vaccinatie, vaccineren, immunizeren, immunisatie, anti-vaccinatie, anti-immunisatie,
<i>Kata (2010)</i>	<i>Vaccine, vaccination, immunization OR immunisation</i>	Vaccin, vaccinatie, immunisatie
<i>Ward et al, (2015)</i>	<i>Vaccin, vaccination, vaccin aluminum, vaccin papillomavirus</i>	Vaccin, vaccinatie, vaccin aluminium, vaccin papillomavirus Vaccin HPV
<i>Added keywords, based on Dutch context</i> <i>Added keywords based on the four major content themes</i>	<i>Dutch context</i> <i>Theme: Safety & effectiveness</i> <i>Civil liberties</i> <i>Alternative treatment</i> <i>Conspiracies</i>	kritisch vaccineren, inenting, kritisch prikken, Veiligheid vaccines, effectiviteit vaccinaties Vaccinatieplicht Alternatief vaccinatie Vaccinatie complot

In the period between December 10th and December 15th, the search queries were entered into Google.nl. This is the Google variant in the Dutch language. Google was chosen as the search engine, as it is the most popular search engine, reported at a 96% market share in the Netherlands according to GlobalStats (2018).

A study by Eysenbach & Köhler (2002) indicated that most people do not look further than the first page (a page consists of ten websites) of Google when searching for health related information. Kata

(2010) researched only the first page of Google research per keyword, considering only the first ten websites found per search. Ward et al, (2015), included the first three pages of Google, or thirty websites, in order to have sufficient results. The current study, too, analysed the first three pages of Google per search query.

For every vaccine critical website a page rank was calculated. The page rank is the place that the website appears at in the Google search engine. The first website to appear in the search has a page rank of 1. The results of the Google search are split up into pages of 10 results each, and with only the first three pages analysed, the lowest page rank a website can have is 30. To illustrate, a website that has been found on the second page of the results, with four other websites above it, obtains the page rank of 15, meaning that it is the 15th website that one will see.

Inclusion & exclusion criteria

In accordance with the methods used by Wolfe et al, (2002), Kata (2010), Bean (2011) and Ward et al, (2015), websites were eligible for analysis when they 1) specifically oppose vaccination for human infants, children and teenagers, or 2) are critical of vaccines. Websites were excluded from analysis if: they are news sites, are only referring to anti-vaccination sites, are medical journals or library sites, are exclusively about adult or veterinary vaccination, or are in a non-Dutch language. Every website was scanned, and categorised as vaccine-critical, pro-vaccination, or as "other", meaning it did not fit the criteria (e.g. a website dedicated to vaccinations for travelling abroad).

Online searching has become an increasingly personalised experience, with search results being based on browsing history (Hannak, 2013). To mitigate effects of personalisation of the search results during the current research, a newly installed internet browser was used, with cookies and search history being cleared between every search.

3.3. Data extraction & Analysis

For a brief definition of content analysis, I refer to Neuendorf (2002) who describes content analysis as the systematic, objective and quantitative analysis of message characteristics. According to Mayring (2014), content analysis is an empirically grounded method, exploratory in process and predictive in intent. Data, in this case the content of a website is examined in order to understand the meaning it has to people, and to understand what the information contained in these websites does.

In content analysis, a protocol for examining the data was established a priori. In the current study the protocol was based on the research done by Wolfe (2002), Kata (2010), Bean (2011) and Ward et al, (2015). Using similar methods, with the search query tweaked for the Dutch setting, should provide results comparable to their work.

Coding was done both inductively and deductively. The main focus of the study, however, was deductive, with the starting point being the theory of criteria and using the coding scheme based on past research. However, inductive reasoning has still been used when applicable: new patterns not covered in the theory were found, and added to the list of content or design attributes. By coding every criteria as either present or absent, the type of content and design attributes on Dutch anti-vaccination websites will be quantified and easily compared to the research on anti-vaccination websites in other cultural settings.

4. Results

4.1. Readers guide

The results section begins with the results of the search queries, and the websites selected. The proportions of vaccine critical to pro-vaccine websites are presented, as well as the pageranks of the selected websites per search query. What follows is a paragraph for every theme of the content attributes, detailing what was found on the vaccine critical websites, as well as making a comparison to what was found on English and French websites from other studies. After, the design elements are examined. Finally, there are three new attributes that were found through inductive examining of the data that are presented. An overview of the results that combines all themes into one table can be found in Appendix 1.A.

4.2. Proportion of vaccine critical websites

A total of 20 unique websites qualified for analysis. Interestingly, many more websites that provided pro-vaccination information came up, compared to vaccine critical websites (see Figure 4). An example of a pro-vaccination websites would be a website by the RIVM, promoting vaccinations, or a blog that criticizes anti-vaxxers. Results were cluttered with websites that did not meet search criteria, such as major news outlets and newspapers. Websites that only concern vaccinations for travelling abroad also showed up frequently.

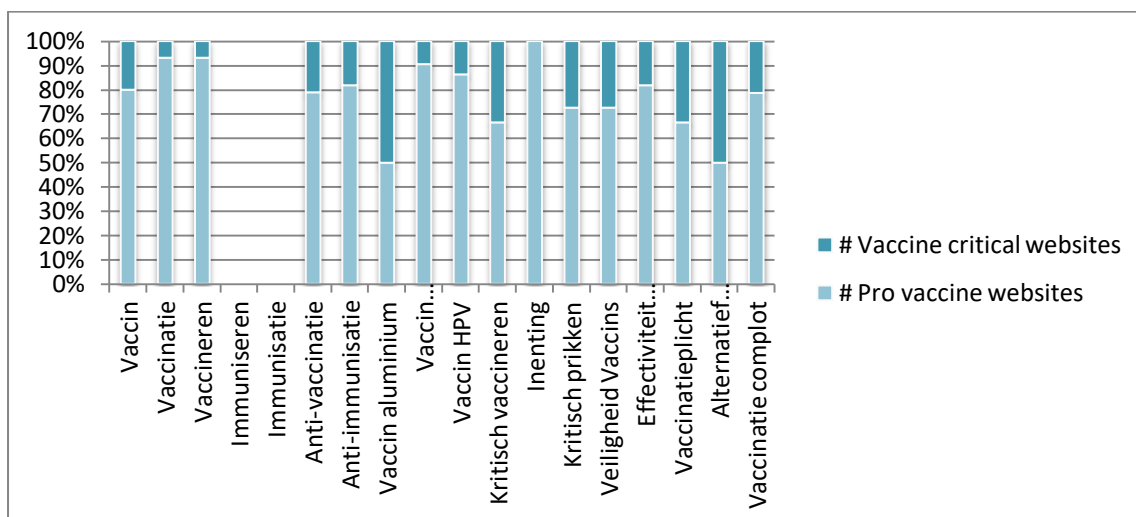


Figure 4: An overview of the proportions of vaccine critical websites (dark blue) to pro-vaccine websites (light blue).

Table 4 gives an overview of the amount of vaccine critical websites found per search query, the amount of websites that were deemed pro-vaccination and the amount of websites that did not fit the criteria. The average page rank of vaccine critical websites varied per keyword, though the average is somewhat high. The six following keywords led to a vaccine critical website appearing at the top of the search results: "Vaccineren", "anti-vaccinatie", "kritisch vaccineren", "kritisch prikken", "alternatief vaccinatie" and "vaccinatie complot". While in nine cases, a search query led to a vaccine critical website appearing within the first ten results, many vaccine critical websites appeared on page two or three of the search results. The term 'vaccine aluminium' resulted in the most vaccine-critical websites (12), followed by 'alternatief vaccineren' (9), 'veiligheid vaccins' (6) and 'kritisch vaccineren' (5). Using the neutral query 'vaccin', only two vaccine critical websites appeared. Similar

with the study of Kata (2010), no vaccine critical websites were found using the search terms 'immunisatie', or 'immuniseren', as anti-vaxxers do not use this term, believing that vaccines do not immunize. For half of the search queries used, vaccine critical websites appeared on the first page of results of Google.

Table 4: An overview of the search results per search query. The number of vaccine critical, pro-vaccine and unrelated websites are presented, as well as the highest and average page rank of the vaccine critical websites.

Query	# Of vaccine critical websites	# Sites that were explicitly pro-vaccination	# Of sites that did not fit search criteria	Highest page rank of vaccine critical website	Average page rank of vaccine critical website
Vaccin	2	8	20	23	24.5
Vaccinatie	1	14	15	15	15
Vaccineren	1	14	15	1	1
Immuniseren	0	0	30		
Immunisatie	0	0	30		
Anti-vaccinatie	4	15	11	1	12
Anti-immunisatie	2	9	19	20	21
Vaccin aluminium	12	12	6	2	13
Vaccin papillomavirus	2	19	9	6	10.5
Vaccin HPV	3	19	8	16	21
Kritisch vaccineren	5	10	15	1	4.6
Inenting	0	13	17		
Kritisch prikken	3	8	19	1	5
Veiligheid Vaccins	6	16	8	4	10.33
Effectiviteit vaccinatie	2	9	12	17	17.5
Vaccinatieplicht	2	4	24	13	13.5
Alternatief vaccinatie	9	9	12	1	10
Vaccinatie Complot	3	11	16	1	18.75

4.3. Safety & Effectiveness

This theme embodies claims regarding the safety and effectiveness of vaccines. Examples of claims that fall into this theme are that vaccines contain poisons, but also that adverse effects of vaccines are underreported, or the trivialisation of vaccine preventable diseases. An overview of the amount of websites a claim has been found, and what the percentage of websites this was for other studies can be found in table 5.

Table 5: Safety & Effectiveness. The amount of times a criteria has been present on websites, on the right the results of previous studies

Content Attributes	Total	Percentage	Wolfe et al, (2002)	Kata (2010)	Bean (2011)	Ward et al (2015)
Safety and Effectiveness						
Poisons	19	95%		100%	80%	94%
Idiopathic illnesses	20	100%	100%	100%	76%	
Immunity eroded	17	85%	95%	88%	32%	47%
Simultaneous vaccines cause adverse effects	5	25%	50%	38%	12%	29%
Hot lots	1	5%		38%		24%
Underreporting	5	25%	95%	63%	36%	41%
Disease decreases	7	35%	73%	88%	32%	
Trivial diseases	8	40%		50%		41%

Poisons

Almost all websites (95%) presented claims in which vaccines were accused of containing poisons or toxic substances. The most common claim found, was that vaccines contain aluminium, which is then described as a neurotoxin. Long essays describing the dangers of aluminium in vaccines are often found on websites. Sometimes it is argued that it is a safe substance when occurring naturally, but becomes very toxic when it is chemically altered for vaccines.

"We are told that aluminium in vaccines is safe, because it is quickly excreted from the body. This is not true. It stays in your body for years after getting the shot."

(<http://gedachtenvoer.nl/het-bmr-autismeschandaal-is-verre-van-voorbij> , translated)

Websites typically share the same information, and refer to the same sources. They often refer to an Israeli professor Yehuda Shoenfield, who claims that aluminium in vaccines lead to "Autoinflammatory Syndrome Induced by Adjuvants", in other words inflammation of the auto-immune system. Another person that is frequently cited is Dr. Roman Gherardi, who claims that aluminium from vaccines stays in the body for a long time after injection. Finally, Dr. Exley, often mentioned in combination with Keele University, is quoted for his research on the effects of aluminium in the body.

The second most common claim was that vaccines contain thiomersal, or mercury, both claimed to be toxic substances. The World Health Organisation states that the toxicity of thiomersal is theoretical only, and that there is no compelling evidence of a safety issue concerning vaccines (WHO, n.d.). While some vaccines in the RVP used to contain thiomersal as an additive, this is no

longer the case. Other concerns were about nano-parts within vaccines, stating that the long term effects of these small particles within vaccines have not yet been researched properly, and the presence of formaldehyde within vaccines.

Idiopathic illnesses

All websites (100%) made some form of claim that vaccines cause idiopathic illnesses. The most common claim is that there is a link between vaccines and autism, often referring to the study by Andrew Wakefield, which was later proven to be falsified. Sometimes the websites acknowledge that the claim was retracted, but then state that this was a cover-up by governmental agencies, painting Wakefield as a rebel doctor, who was unjustly scrutinized by the scientific community. Other times they refer to Wakefield as if the study was never retracted, and take its implications at face value or exaggerate it's finding to serve their agenda.

Another common claim was that of a link between vaccines and allergies or asthma. With this claim, a comparison is drawn between non-vaccinated populations and vaccinated populations, and claimed that while in the non-vaccinated population nearly no one has developed allergies or asthma, while in vaccinated populations these are common occurrences.

"One in eighty-eight children is diagnosed with autism, while half of all children struggle with chronic diseases such as asthma, ADHD etc. This rise in illnesses correlates with the dramatic increase of vaccines given to our children, coupled with an increasing exposure to other toxic chemicals."
(<https://www.wanttoknow.nl/gezondheid/vaccinaties-gezondheid/hoe-vaccins-ons-afweersysteem-ernstig-ondermijnen/> , translated)

Other diseases or illnesses caused by vaccines that were mentioned include auto-immune diseases, ALS, MS, Parkinson, Alzheimers, epilepsy, chronic fatigue, ADD or ADHD and cancer. A couple of websites also mentioned sudden infant death syndrome (SIDS), where the baby dies shortly after getting a vaccination, attributing it to the vaccination. It is also mentioned that this is a made-up term to cover up deaths caused by vaccines.

Immunity

Claims regarding the decline in immunity after vaccinating were found on 85% of the websites. Examples of claims within the range of immunity are stating that the natural born immune system has no chance to develop by vaccinating, saying that vaccines only prevent partial immunity and straight up stating that vaccines do not work.

"In this article I am telling you that it is proven that vaccines affect the immunesystem negatively, according to the RIVM."
(<https://www.ronhenfling.nl/nl/nieuws/rivm-vaccins-kunnen-het-immuunsysteem-verstoren/>, translated)

Another claim made was that non vaccinated children are less prone to developing allergies compared to vaccinated children. This claim coincides with the one listed under idiopathic illnesses, though on six websites the failing immune system was explicitly mentioned as a cause for this.

Other claims regarding safety and effectiveness

Five websites (25%) claimed that getting simultaneous vaccinations especially cause problems. They mention that combination vaccines such as the MMR vaccine strain the immune system of infants too much. Others mention that getting multiple, separate shots in a narrow time window can cause adverse effects. Only one mention of 'hot lots', or contaminated batches of vaccines were found on a website, stating that vaccines from one certain manufacturer were contaminated.

Some websites (25%) claimed that adverse effects of vaccines were underreported, or covered up. The given explanation for this is that the time window between getting the vaccination and the adverse effects showing up is too big.

"All these problems can also arise weeks, even months after getting the shot. If this happens, there is usually no assumed relation or correlation with the vaccines."

(<http://www.menssana.nu/pages/nl/publicaties/voor-professionals/rijks-vaccinatie-programma.php>, translated)

Seven websites (35%) mentioned the fact that incidence of certain diseases decreased greatly by other means such as better hygiene and diets, and that vaccines did not contribute to this. While it is true that some diseases decreased due to factors other than vaccination this does not imply that vaccines do not work at all, or are unnecessary, which is what the sites portray vaccines as.

Last in this category, there is the trivialisation of vaccine preventable diseases. Eight (40%) of websites made a mention that some, or all, vaccine preventable diseases are just mild, and argue that the risk of adverse effects due to vaccinating is greater than the risks of long term damage done by the disease. Other claims are that it is important to experience these diseases at an early age, to get lifelong immunity while vaccination only provides immunity for a certain time frame. Two sites also mention that some vaccines are unnecessary, questioning why a baby needs a hepatitis B shot.

Comparison

Looking at the safety & effects type of claims made on websites, it becomes apparent that nearly all analyzed websites imply that vaccines contain poisons, all websites claim that vaccines cause some form of idiopathic illness, and 80% of websites imply that vaccines are not beneficial for the immune system. This is not unique to the Netherlands, as the same results have been recorded for websites in English (Kata, 2010; Wolfe et al, 2002; Bean, 2011) and French (Ward et al, 2015). It should be noted, however, that claims regarding the erosion of immunity were less commonly found on French websites (Ward et al, 2015) and on English sites examined by Bean (2011), 47% and 32%, respectively, than on Dutch websites (85%). Interestingly, not one of the analysed websites made a mention of hot lots of vaccines, that are supposedly more dangerous than other lots, while both French and English websites did (Ward et al, 2015; Kata, 2010). Bean (2011) and Wolfe et al (2002) both did not include this statistic in their analysis.

Though Wolfe et al (2002), and Kata (2010) make no mention of claims regarding aluminium, it becomes clear in study by Bean (2011) that it is a commonly used argument. This notion is furthered by the study of Ward et al, (2015), who even specifically included it in their search terms. In this study, again, it is the most mentioned toxic substance within vaccines, which is in line with the previous research. It appears that the claim regarding aluminium is not culturally dictated.

Claims that adverse effects of vaccines are systematically underreported were found to be less common on Dutch websites than on both English websites and French websites. The number of claims regarding underreporting have dropped significantly for English websites (95% for Wolfe et al in 2002 to 36% for Bean in 2011). Bean (2011) explains that this is caused by the increase of public awareness of where to report adverse effects concerning vaccines in the USA. In the Netherlands the alternative for it is Lareb, which is for all medicine.

4.4. Alternative medicine

Claims fall within this theme when they support the use of alternative treatments over vaccines, critique the science behind vaccines, or emphasise the importance of natural resistance against diseases, rather than vaccines. An overview of the results can be found in table 6.

Table 6: Alternative Medicine. The amount of times a criteria has been present on websites, on the right the results of previous studies.

Content Attributes	Total	Percentage	Wolfe et al, (2002)	Kata (2010)	Bean (2011)	Ward et al (2015)
Alternative medicine						
Alternative treatments	12	60%	70%	88%	20%	29%
Critiquing biomedicine	8	40%		75%	4%	35%
Implied debate	9	45%		38%	16%	71%
Back to Nature	11	55%		88%	24%	35%
Products for sale	5	25%		13%		

Alternative Treatments

Many of the vaccine critical websites could be described as websites promoting homeopathic or other alternative forms of medicine rather than supporting traditional medicine. These websites mentioned alternatives to vaccination, most notably homeopathic prophylaxis (HP). This is a method developed by Dr. Isaac Golden, a classic homeopath. By diluting a substances containing certain germs, one could immunise without getting a vaccination. Details of the treatment and a comparison between homeopathic prophylaxis and vaccination can be found on multiple websites.

"HP is a beautiful, alternative, method to vaccinating. A lot of experience has been gathered with it. The effectiveness and safety of HP is shown in a scientific way by Dr. Isaac Golden."
(<https://www.martindemunck.nl/diensten/homeopathische-profylaxe/>, translated)

Another commonly seen alternative treatment is the CEASE method, developed by Tinus Smith. CEASE stands for Complete Elimination of Autistic Spectrum Expression. It is a method that protects children from becoming autistic after getting vaccinated. This refers again to the study by Wakefield in which a link was made between vaccines and autism.

Other treatments mentioned were about reducing the negative effects after the vaccination has taken place, or homeopathic substances to accompany the vaccinations in hopes of reducing adverse reactions to the vaccine.

Implying debate about the necessity / effectiveness of vaccines

Many websites do not even imply that there is a debate about the necessity or effectiveness of vaccines, but rather state that there is no doubt about the adverse effects of vaccines. By stating that there is an overwhelming majority of evidence weighted against vaccines, that there is no room for debate. Some websites are a bit more nuanced in this regard, and imply that a good weighting between the pros and cons of vaccinations should be made.

Back to Nature

Many websites (55%) emphasise that vaccines are not natural, and are therefore bad for your health. A few websites for example, make the argument that while aluminium in its 'natural form' poses no threat to your health, its 'tampered form' within the vaccine is toxic. Most arguments in this category can be described as implying that anything natural is healthy, while unnatural medicine is not healthy. Websites typically do not denote what exactly the divide between natural and unnatural is, though vaccines certainly fall into the latter category.

Critiquing Biomedicine

Critique of biomedicine, or the science behind vaccines is a rather common occurrence on vaccine critical websites (40%). The scientific methods of determining whether or not a vaccine could be considered safe is questioned often, claiming that current methods are outdated, and are based on some wrong assumptions. Common attempts to debunk the current research are the claims that long term effects of vaccines are not properly tested and only the short-term side effects are monitored, and that there has been no proper control group set-up where vaccinated people are compared to un-vaccinated people. While the biomedicine is criticised, a belief in science in general is not usually rejected, and other 'scientific' sources are used as evidence of vaccines being toxic or harmful.

"Studies about the safety of vaccines that fulfil these criteria have never been conducted, or the results have not been published. The long term safety of vaccinations have therefore never been scientifically researched."

(<https://www.ronhenfling.nl/nl/nieuws/rivm-vaccins-kunnen-het-immuunsysteem-verstoren/> , translated)

Products for sale

A handful of sites (25%) were attempting to sell products through their vaccine-critical articles, such as 'healthy juice' or vaccine critical literature. Some websites offer homeopathic therapies such as the CEASE method, counselling, or therapies unrelated to vaccines.

Comparison

The amount of websites promoting, or suggesting the superiority of alternative treatments was significantly higher in the current study (60%) compared to the study on French websites by Ward et al, (2015) (29%), and the study on English websites by Bean (2011) (20%). However, the English websites studied by Wolfe et al (2002) and Kata (2010) both report higher percentages of websites promoting alternative treatment than the current study.

While herbalism, chiropractics and acupuncture were all mentioned by the previous studies on English websites (Wolfe et al, 2002; Kata, 2010), these did not show up on any of the Dutch websites. Many of the websites found in the current study promoted not only treatments as an alternative to

vaccination, but also treatments that are supposed to help alleviate negative side-effects of vaccination. The only other study making a note of this is that by Wolfe et al (2002). No specific treatments were mentioned by previous studies, it is therefore unknown if treatments such as homeopathic prophylaxis or CEASE therapy appeared on non-Dutch websites.

The studies of Wolfe et al (2002) and Kata (2010) specifically mention the critique of germ theory by Louis Pasteur as a commonly occurring claim against vaccinations, stating that diseases don't come from microorganisms but rather from imbalanced bodily conditions and lifestyle. There are Dutch websites that imply the need for a balanced bodily condition or a healthy diet rather than vaccination, but no websites were found that directly critiqued germ theory, implying that diseases do not come from microorganisms. The critiques of biomedicine on Dutch websites is not about the rejection of biomedical theories, but rather the methods of research used. These critiques are not explicitly mentioned by the studies on both English and French websites.

4.5. Civil Liberties

Statements that make claims about the way in which vaccines oppress parental rights, parents being monitored and pestered for not taking their vaccines, and imply that the government uses vaccines to further their power, fall into the category of Civil Liberties. For an overview of the results, see table 7.

Table 7: Civil liberties. The amount of times a criteria has been present on websites, on the right the results of previous studies.

Content Attributes	Total	Percentage	Wolfe et al, (2002)	Kata (2010)	Bean (2011)	Ward et al (2015)
Civil Liberties						
Parental Rights	16	80%		75%	16%	
Monitoring	1	5%		25%		
Totalitarianism	5	25%		63%	20%	

Parental Rights

Many websites (80%) construct some form of argument that considers parental rights. Vaccinations are not mandatory in the Netherlands, and vaccine critical websites intend for it to stay this way. They frequently remind the reader that it is not mandatory, and that we should take action in preventing this from ever happening. They stress that it is *your* choice to make, and not that of the government. Websites also mention that many people feel pressured by their social environment in the decision making regarding vaccination, sometimes by their peers, often times by official instances such as the "consultatiebureau", doctors or the RIVM. Lastly, the claim is made that one cannot sue anyone for damages caused by vaccinations, as the pharmaceutical industry is supposedly protected by the law, which can be interpreted both as an issue of parental rights as well as an issue of "Big Pharma" (an accusation of pharmaceutical companies conspiring and being corrupt) being protected by the government.

"Vaccinations seem mandatory, but they aren't. There are tons of possibilities to deviate from the vaccination schedule." (<https://blog.conamore.com/uncategorized/vier-alternatieven-voor-vaccineren> , translated).

"Parents that want to deviate from the vaccination schedule get to hear at the -consultatiebureau- that they need to visit a doctor, and pay for the vaccinations themselves. For many critical parents this is seen as a policy that discourages deviating from the schedule of the -consultatiebureau-, while there is no lawful obligation to vaccinate."

(<http://www.menssana.nu/pages/nl/publicaties/voor-professionals/rijks-vaccinatie-programma.php>, translated)

Monitoring & Totalitarianism

Only one website mentioned that the government, specifically the RIVM, monitored who got vaccinated and who did not, and harassed those who did not vaccinate with folders about the benefits of vaccination. Five websites made claims regarding totalitarianism of the government. The argument is constructed in a way that makes it seem as if the government, either the national or the European Union, is using vaccines as a way to exert power. Websites warn that the Dutch government is trying to make vaccinating mandatory.

"And what they are trying now EU, attempting to force mandatory vaccines, or you have to give away our passport, drivers license or even your admission to health insurance. And people, I've been saying this for at least ten years now, this is how they could realise mandates. " (<https://www.wanttoknow.nl/gezondheid/vaccinaties-gezondheid/de-raaskalddiscussie-over-de-heilige-vaccinatus/>, translated)

Comparison

Wolfe et al (2002) mention that 77% of the English websites analysed were raising concerns of civil liberties being at stake due to vaccination mandates. In their study they did not differentiate between parental rights, governmental monitoring or totalitarianism, which only Kata (2010) and Bean (2011) did. Similar results concerning parental rights were found comparing the Dutch websites (80%) to the English websites analysed by Kata (2010) (75%), though not nearly as many English websites analysed by Bean (2011) contained claims about parental rights (16%). Comparing totalitarianism, then the opposite applies where the results are similar to Bean (2011), and differ from Kata (2010). No comparison can be made with the French websites, as Ward et al, (2015) did not include this theme in their studies.

4.6. Conspiracies

Conspiracies surrounding vaccines are a major theme found among vaccine critical websites. It is not uncommon for websites to discuss conspiracies outside of the vaccination domain, too. Claims concerning conspiracies are mainly about the pharmaceutical industry and the government, often accusing them of conspiring and colluding. An overview of the results is found in table 8.

Table 8: Conspiracies. The amount of times a criteria has been present on websites, on the right the results of previous studies.

Content Attributes	Total	Percentage	Wolfe et al, (2002)	Kata (2010)	Bean (2011)	Ward et al (2015)
Conspiracy		0%				
Profit	10	50%	91%	75%	52%	65%
Collusion	11	55%		63%	20%	
Protection	4	20%		50%		
Cover-ups	17	85%		75%	20%	82%
Rebel Doctors	15	75%		50%	4%	41%
Foolish Doctors	3	15%		25%		
Fear-Mongering	14	70%		50%	8%	
Unusual Theories	8	40%		38%	16%	38%
Privileged Knowledge	15	75%		50%	8%	
Anti-science	2	10%		38%		
Informed choices	16	80%		38%	24%	

Profit, Collusion & Cover-ups

The accusation that vaccines are made with profits as its end goal, with the pharmaceutical companies profiting off of well-willing parents can be found on half the analysed websites. Pharmaceutical companies are often grouped and nicknamed as "Big Pharma", a term referring to a conspiracy theory that accuses the pharmaceutical companies of suppressing real medicine in favor of worse working medicine in order to oppress people.

"That pharmaceutical companies profit from illnesses (or the protection thereof) is old news, but more recently more and more 'insiders' are willing to tell us about how these mega powerful concerns manage to be the most profitable industry again and again."

(<http://www.earth-matters.nl/20/14133/vaccinaties/mijn-visie-op-vaccinaties.html> , translated)

The idea that the vaccine programme is surrounded by collusions is prevalent in 60% of analysed websites. The usual suspects are the pharmaceutical industry, the government and the media. The pharmaceutical industry makes the vaccines, the government promotes them and the media only tells a one-sided story, where any adverse effect caused by vaccines is covered up. The idea that adverse effects are covered up came up on 85% of websites - sometimes by the media, other times by the government. Several websites mention that the RIVM supposedly keeps certain research papers away from the public because they report negatively about vaccinations.

Another cover up is that research is being manipulated in favour of vaccinations, done by the pharma companies themselves instead of independents

Rebel Doctors & Foolish doctors

Doctors that are critical of vaccines, or support alternative methods, are lauded on 75% of websites. Besides 'rebel doctors', the honouring of so called whistleblowers is also a common occurrence on vaccine critical websites. While they are mostly foreign whistleblowers, a couple of websites make

the claim that there is a former employee of the RIVM that left her work after doing her own research and finding that vaccines do not contribute to public health.

"Luckily there are more and more doctors, nurses, (medical) scientists and others that are opening up about their doubts about the benefits of more, and earlier vaccinations."
(<https://www.homeopathie-behandelng.nl/vaccinatie-wel-niet/de-reden-dat-we-vaccineren>, translated)

Two websites refer to doctors supporting vaccines as 'foolish'. One calls a PhD researcher on vaccines naïve, another accuses doctors of causing damages due to their unintended carelessness regarding vaccines.

Fear Mongering

Fourteen websites (70%) are using exaggerations as a scare tactic, inciting fear in the reader. Using words such as deadly, unthinkable or extremely dangerous, and making these pieces of text stand out by for example writing them in capital letters, an attempt of installing fear in the minds of the reader is made.

Unusual Theories

Unusual theories are present on 40% of the websites. One states that there were no anti-genes in certain vaccines, and speculates about the true purpose of those vaccines, if they were not made to combat diseases. One website speculates that vaccines are a plot to decimate the underclass of society, another writes that vaccines can be used to alter DNA of humans. Several websites mention that vaccines are an experiment.

Anti-science

The complete rejection of science and embracing the otherworldly or spiritual methods is not common on Dutch vaccine critical websites. Almost all websites refer to science in one way or another, even if they imply that the methods used in mainstream science are wrong, they do not reject science as a whole for other alternatives. Even homeopathic methods are backed up by scientific articles. One website outright calls the science behind vaccines 'dumb', completely rejecting it, another refers to the parental love as the most important factor in keeping children harm-free, rather than scientifically proven methods.

Informed Choices

One characteristic of modern day anti-vaxxers is that they are inclined to do their own research (Dubé, Vivion & MacDonald, 2014). This notion is reinforced by the amount of websites (75%) that are recommending their readers to inform themselves, and more importantly, by conducting their own research. Besides this, most websites emphasize that vaccination is a choice, and state the importance of transparent research.

"I recommend all parents to ask about all the named side-effects of vaccinations to the person administering them. Also ask for the contents, the brand and the producer of the vaccin."
(<https://www.larsvanhemmen.nl/Vaccinatie-RIVM/autisme-vaccinatie/index.html>, translated).

Protection

Protection only came up on four websites (20%). The pharmaceutical industry responsible for vaccines is being protected by the government, with laws in place so that they cannot be held responsible, is the claim found on these websites.

Privileged Knowledge

Three quarters of all websites implied to have knowledge that was either rejected by the government or scientific institutions, or not known by those instances. The knowledge that is claimed to have is quite diverse, though many times they refer to research done by fringe groups, which is not accepted by mainstream science. This particular claim is often unaccompanied by sources altogether, just referencing to 'scientists'. A bunch of website claims that no research has ever been conducted about the toxicity of vaccines, because it is assumed that vaccines simply are not toxic. Multiple websites claim that they are in possession of 'secret' documents, that prove that the government has always known that vaccines are not effective, and cause the diseases that they are supposed to protect from.

"The only way to prove whether vaccines are responsible for this [diseases], is large-scale comparative research with an UNVACCINATED control group. Why is there no research being conducted that compares the health of vaccinated children to unvaccinated children?"
(<https://www.natuurdietisten.nl/twijfels-over-veiligheid-vaccins/>, translated)

Comparison

About half of the websites analysed in the current study contain allegations that the motives behind vaccines are based on profit rather than good health, which is similar to the studies on English and French websites. Dutch and French websites reported roughly the same amount of websites making claims of cover-ups. While 75% of English websites studied by Kata (2010) made claims regarding cover-ups, only 20% of English sites analysed by Bean (2011) held these claims.

Dutch websites tend to refer more often to rebel doctors than both English and French websites. Kata (2010) states that 50% of websites refer to rebel doctors, while Bean (2011) only 4% do. For French websites, this was higher at 41%, though not as high as for Dutch websites (75%).

Compared to previous studies, many more Dutch websites lay emphasis on informed choices. In the current study, 80% of websites stressed the importance of reading up on the subject or similar advices. The studies of English websites noted significantly fewer instances of informed choices on websites: 38% for Kata (2010) and 24% for Bean (2011). Both Wolfe et al (2002) and Ward et al, (2015) did not include this measurement specifically. The same applies to websites claiming to possess knowledge not previously known to the public, present on 75% of Dutch websites, and only 50% (Kata, 2010) and 8% (Bean, 2011) for English websites. Dutch websites also seem to lay more emphasis on inducing fear into their readers, as 70% of analysed websites were found to include claims that exaggerate the ill effects of vaccines, compared to 50% (Kata, 2010) and 8% (Bean, 2011) of English websites.

4.7. Morality, Religion & Ideology

This theme encompasses three types of claims. First, there are claims stating that vaccines should be avoided because usage of them does not correspond with religious guideline. Second, claims that vaccines should be avoided because there are immoral aspects to vaccines, for example the alleged use of tissue of babies in the fabrication process. Finally, statements that condemn vaccines because they may be beneficial to humanity (anti-utilitarianism) are recorded here, too. An overview can be found in table 9.

Table 1: Morality, Religion & Ideology. The amount of times a criteria has been present on websites, on the right the results of previous studies

Content Attributes	Total	Percentage	Wolfe et al, (2002)	Kata (2010)	Bean (2011)	Ward et al (2015)
Morality, Religion, Ideology						
Religious tenets	0	0%		25%		0%
Immoral acts	2	10%		38%		6%
Anti-utilitarianism	0	0%		13%		0%

Religion did not have a place on the websites that were analysed, and neither did anti-utilitarianism. Only two websites considered vaccination an immoral act, due to the accusation that vaccines were tested on infants.

It is not surprising that websites had barely any claims that fall in the morality, religion or ideology category, going by previous findings. The results of this study are similar to the results of Ward et al, (2015), whose results also show no claims other than immoral acts, and even then only 6% of analysed websites contained them. This is different when compared to Kata (2010), who found multiple websites containing both religious arguments or anti-utilitarianism sentiment on vaccine critical websites. She also found more websites accusing vaccines as being immoral than both the present study and that of Ward et al, (2015). Both Wolfe et al, (2002) and Bean (2011) made no mention of this category.

4.8. Design Attributes

The manners in which websites were designed, and attempted to get their message across was measured. The design attributes are divided into three themes. First there are emotive appeals, which includes attributes that are aimed at generating an emotive response to the content of the website. Second, there are the content aspects that include details of the website such as the amount of links to other vaccine critical websites present. Finally, there are three attributes that have emerged inductively from the data, and were not included in previous studies. An overview of the results is presented in table 10.

Table 20: Absolute amount, and percentage of websites containing design attributes

Design Attributes	Total	Percentage	Wolfe	Kata	Bean	Ward
Emotive Appeals						
Personal Testimonies	6	30%	55%	88%	32%	65%
Victim Imagery	6	30%	23%	50%	24%	18%
Needle Imagery	11	55%	32%	13%	36%	29%
Us vs Them	3	15%		50%		
Responsible Parenting	16	80%		50%		
Content Aspects						
Negative Links	18	90%	100%	100%	56%	47%
Positive Links	5	25%	45%	50%	24%	18%
Status	1	5%		25%	12%	
Exemptions	6	30%		50%	8%	12%
Adverse Reporting	8	40%		25%	20%	24%
Attorneys	0	0%		25%		0%
Commercialism	8	40%	43%	75%	44%	41%
Solicitations	2	10%		63%	24%	41%
New: Social aspects						
Social Media	15	75%				
Youtube	12	60%				
Comment Section	9	45%				

4.9. Emotive appeals

Many websites (80%) try to persuade the reader to think twice about vaccinating, by appealing to emotions of parental responsibility. Especially because the vaccination programme in the Netherlands is voluntary, it is important for the websites to appeal to the parents themselves to take action. Emphasising that it is their responsibility to make the decision to vaccinate, and not that of the state, the doctors, or their social environment was often used to convince the reader.

"The information provided on this website is not meant as an individual medical advice. Taking all the factors that lead to an individual decision into consideration is still the responsibility of the individual."

(<https://www.natuurdietisten.nl/lastige-vaccinatie-keuzes/>, translated)

Some websites (30%) support the idea of responsible parenting by showing personal testimonies of parents that did not vaccinate, sometimes emphasising the hostility of their social environment when they came to the decision not to vaccinate. Other forms of personal testimonies were not linked to responsible parenting, but rather the stories of parents whose children became ill after vaccinating. The websites Vaccinvrij.nl even supports a whole platform on its site where parents are able to exchange their experiences about what it is like to grow up without vaccinations, damages caused by vaccinating, or experiences at the child healthcare clinic.

"I called the RIVM multiple times with difficult questions regarding chemical compounds of vaccines, and if they can guarantee that vaccinating is 100% safe, and useful. I never got any concrete answers."

(<https://stichtingvaccinvrij.nl/ouderplatform/opgroeien-zonder-vaccins/>, translated)

About half (55%) of websites used images of needles in their articles regarding vaccination. The pictures used were often in combination with a distressed looking infant. It seems to incite the idea that the infant does not want to be vaccinated. Less common were pictures of victims. Pictures were coded as victim imagery when it contained an ill looking, or hurt infant. Within this category the most common picture was that of an infant that had contracted the measles, accompanied by either the statement that vaccines are not effective at stopping illnesses such as the measles, or that it is perfectly normal, even healthy, for an infant to experience 'child diseases'.



Figure 5: Example of a 'scary needle' picture found on a vaccine critical website

(<https://www.wanttoknow.nl/overige/de-onbewuste-media-vaccinatie-manipulatie/>)

Comparison

The use of parental testimonies was found to be lower for Dutch websites (30%) when compared to English websites (Wolfe et al, 2002; Kata, 2010) and French websites (Ward et al, 2015), but were similar to English websites analysed by Bean (2011). While the amount of victim imagery is similar to previous studies, the use of needle imageries seem significantly higher on Dutch vaccine critical websites than their English or French counterparts.

Kata (2010) was the only one of the previous studies to include the "us vs them" aspect in the results. In her study 50% of English websites portrayed anti-vaxxers as battling the government, while in the current study only 15% of Dutch websites did so.

4.10. Content Aspects

Most sites (90%) that were analysed contained links to other vaccine critical websites or articles, usually multiple links were provided. The most commonly linked websites were NVKP.nl, and vaccinvrij.nl, two major hubs of anti-vaxxers in the Netherlands. Only five website provided the reader with links to pro-vaccine websites. Typically, this was the website of the RIVM or the RVP, and was used to refer readers to what "the opposition" was telling you.

Six websites (30%) laid emphasis on that it is not mandatory to get a vaccination, and on how to avoid getting one. Tips for dealing with the child health care service, or the social environment of were given. No websites provided links to attorneys in order to avoid getting a vaccination, which was to be expected as vaccinations are not mandatory in the Netherlands.

On 40% of the websites commercialism could be seen. This takes the form of being able to make purchases of vaccine critical literature on the website, or being able to make an appointment with a homeopath for treatment after getting a vaccination. Only two websites encountered were soliciting for donations to support the website and keep it running.

A reference to Lareb, a Dutch organisation that monitors risks and side-effects of medicines including vaccinations, was made on 40% of websites. The websites were encouraging the readers to search contact with Lareb if they experienced any adverse effects from the vaccines. Some sites were critical of Lareb, however, stating that they were not acting on the complaints about vaccines, insinuating that it is a containment unit to cover up negative information about vaccinations.

Comparison

The amount of websites containing links to other vaccine critical websites was found to be much higher than the recent studies by Ward et al, (2015) and Bean (2011), and is more similar to the less recent studies of Kata (2010) and Wolfe et al (2002), meaning that Dutch websites refer to other vaccine critical websites more often than French websites. The amount of links to pro-vaccination websites, however, remained about the same across all cultures. Dutch websites also make references to places where you can report adverse effects of vaccination about twice as often as English and French websites do. While the amount of commercialism, or sites attempting to sell something to the reader, is roughly the same across cultures, the amount of websites soliciting for donations is significantly less present on Dutch websites.

4.11.New attributes: social aspects

Many websites encountered in this thesis contained social aspects, not previously documented in studies. Most websites (75%) contained links to their social media. Usually a Facebook page, Google+, Twitter or Instagram were present. Many websites ask users to share the webpage on their social media, and track how many times an article has been shared. This ranged from being shared zero times, to tens of times, to ten thousands of times.

Twelve websites used Youtube.com as a means to get information across. By embedding a video on their websites, they invite the user to look at it. The video's shown on Youtube were not made by the websites themselves, but rather by other anti-vaxxers. All linked video's were in English, with remarkably no Dutch videos, and many websites linked to the same video, where Dr. Exley from Keele University talks about the dangers of aluminium in vaccines.

Another interesting addition to the coding scheme is noting the presence of a comment section. Previous studies did not shed light on this, but it is an integral part of a website in this day, that people are able to pose questions about, or discuss what is written on the website. A little less than half (45%) of analysed websites contained a comment section, though it was only really active on a handful of sites.

5. Discussion & Conclusion

5.1. Readers guide

This chapter starts with a discussion of the main findings of this study, followed by a discussion of the theory that was used. Then the strengths and limitations of the study are addressed, followed with recommendations for future research, and ending with a conclusion.

5.2. Major findings

The aim of this study was to identify the content and design elements used on vaccine critical websites in the Dutch language, and compare these to results of similar studies in other cultural settings. This was done by categorizing attributes of vaccine critical websites and marking them as present or absent, in the same way as previous researchers (Wolfe et al, 2002; Kata, 2010; Bean, 2011; Ward et al, 2015) did.

The most represented attributes of websites are the claims of vaccines containing poisons or vaccines causing idiopathic illnesses, which is the same for Dutch websites as it is for websites in other cultural settings. The second most present theme is that of conspiracies, most notably the idea that the government covers up adverse effects of vaccinations and the stressed importance of making informed choices. While the overall results for the theme of conspiracies are quite comparable for Dutch and other cultural settings, the importance of informed choices is notably present in higher numbers on Dutch websites.

Alternative treatments were promoted rather often on vaccine critical websites, as well as the implication that we need to go back to nature or that natural way of going through a disease is superior. Both these results were higher than the percentages found in the study in a French setting. The importance of civil liberties, or more specifically the issue of parental rights was found on 80% of websites, which is higher than the results found in other cultural settings. The theme of morality was barely present on any Dutch website, though the absence of this theme is also noted in other cultural settings.

The emotive aspects of design on websites were similar on Dutch websites as on websites in other cultural settings. The use of parental testimonies, however, was slightly lower than found on websites in the French setting, and the needle imagery slightly higher than in both the French and English settings. For the content aspects of the design of the websites, the amount of links to other vaccine critical websites was considerably higher in the Dutch setting, compared to the French setting, but was similar to the English settings. The amount of solicitations, where websites ask for donations, was found to be lower on Dutch websites than in other cultural settings.

New attributes emerged from Dutch websites: the use of YouTube videos as source material, the links to social media platforms associated with the websites, and the inclusion of a comment section. These elements were not identified in other studies, so a comparison cannot be drawn.

5.3. Linking to theory

Overall, most of the websites contained attributes that can be related to issues of confidence. The three attributes that were present on the most websites were attributes regarding idiopathic illnesses, vaccines containing poisons and the government covering up adverse effects of vaccination, all of which attack the confidence one may have in either the vaccine or the policymaking behind the

vaccines. Attributes relating to the complacency part of the three C's model are less common than those in the confidence area. The trivialisation of vaccine preventable diseases and the claim that vaccine preventable diseases were eradicated through other means than vaccination are still present on slightly less than half the websites, so it is not uncommon to come across claims that target complacency.

The combination of websites emphasising the importance of parental rights and making informed choices coupled with many attempts to discredit traditional sources of vaccine related information such as the RIVM, and quoting niche, 'rebel', doctors is an interesting way in which vaccine critical websites try to persuade their readers. By making these claims, it is attempted to increase the weight of the arguments and claims present on vaccine critical websites, influencing the calculation process, which is the fourth C as described by Betsch (2015). By providing many more links to other vaccine critical websites and articles, readers that have been persuaded to do their own research are most likely exposed to one-sided arguments battering down on vaccines, rather than looking at both sides fairly.

The three C's model is useful for explaining the causes of vaccine hesitancy. However, it does not lend itself perfectly as a model for examining vaccine critical websites. While claims on websites represent the areas of confidence and complacency well, convenience is of no use. For the fourth C, too, content on websites cannot be directly categorised as calculation, as it is the whole of all information found on all vaccine critical information that influences calculation. Excluding the information that may be found on websites that are promoting vaccination makes it difficult to fully grasp the calculation part of the model.

Both the peripheral and the central routes play important roles for vaccine critical websites. Websites typically bombard the reader with facts about vaccines, accurate or not, and combined this cleverly with imaging of needles and crying children. While readers of vaccine critical websites are likely motivated to read and process information, they are not only using the central route (Goh & Chi, 2017). Because some websites provide so much, often not very condensed, information, it becomes difficult for readers to keep high elaboration, making the peripheral route more prominent. While the elaboration likelihood model can provide key insights into the way that vaccine critical websites influence their readers, it fails to do so in the current study. Even though assumptions about the effects of the content and design of the websites on the reader can be made using the model, it is speculation and has not been measured. To fully make use of the model, a different study design, e.g. an experiment, would provide better insight.

Reflecting on the list of content and design attributes used, it becomes apparent that content found on vaccine critical websites barely use certain claims. Not only on Dutch websites, but the same applies to both English and French websites, too. The whole theme of morality, religion, and ideology was barely present on any of the websites, this does not seem to be focus points for modern anti-vaxxers (Dubé, Vivion & MacDonald, 2014). Between studies the list of content and design aspects that was used has changed. Considering the results of the current study, the use of social media would be a good fit to add on the list of design elements, seeing how many vaccine critical websites provide the user with links to their social media channels. It has become important to not only monitor vaccine critical websites, but the activity of anti-vaxxers on social media, too.

5.4. Strengths and Limitations

This was the first study that integrated the contents and design elements found on vaccine critical websites to a theoretical framework of the three C's model and the elaboration likelihood. Previous studies (Wolfe et al, 2002; Kata, 2010; Bean, 2011; Ward et al, 2015), did not incorporate a theoretical framework in their works. The current study is also the first to include notions of social media on vaccine critical websites.

Because the websites were coded by only one person, the intercoder reliability could not be established. By nature of the content analysis, the interpretation of some statements is up to the coder. By having multiple people code the same segment, an intercoder reliability can be established, to assess if they interpret the codes in the same way (Herring, 2009). To increase the reliability of the results in the current study, every websites was analysed twice, with some time in between, and results were compared to see if the interpretation was still the same.

Not all previous research used the exact same coding scheme of content and design attributes, which for some aspects made it impossible to do a comparison, as there was no data for that given attribute. The list used by Kata (2010) was used in the current study, because Kata (2010) was more clear about the meaning of the attributes than other researchers (Bean, 2011; Ward et al, 2015).

Previous studies also included the aspect of credibility of websites in their coding scheme, where they looked at the validity of statements and identify misrepresentations of quoted research for example. While initially the plan was to include these aspects in this thesis, ultimately the decision was made not to do this, as I lack the expertise to identify falsehoods and misrepresentations of the research.

When looking at the results of a Google search, it is important to note that it is a recorded snapshot of time. The rankings of pages are not set in stone, but are dynamic and may be subject to change over time. A website that now comes up as the first result of a search, may be the fifth result in a month's time. A major event happening, such as a scandal relating to vaccines, may also influence the page rankings as people may be more inclined to look for opinions of vaccine critical groups. In this study the effects of personalisation were reduced as much as possible, while for a regular user of the internet the results may differ, based on the websites that they previously visited (Hannak, 2013). While Google is the most popular search engine for the general public, it is possible that those who are interested in conspiracies use a different search engine, such as DuckDuckGo, that values privacy more (Hannak, 2013). The usage of search engines under vaccine hesitant populations, however, has not been studied.

5.5. Recommendations

In this study, the aspects of social media, the comment section, and the use of Youtube emerged as new attributes of design aspects. While I recommend that these be kept in future research, they also present a completely new research area, too. While some studies (Betsch et al, 2012; Wilson & Keelan, 2013) have investigated the usage of social media by vaccine critics, their arguments have not been categorised as systematically as done by the methods used in this thesis. I would recommend that especially the contents found on social media are investigated using the same coding scheme as used in this thesis.

The current study has shown many similarities between Dutch websites and English and French websites, with some differences as well. To further investigate the differences between cultures in the use of vaccine critical arguments, it would be interesting if this research is replicated in many different cultural settings. Especially research on continents such as Africa or Asia could provide key insights, as the current body of research has focussed on Western countries.

The methods employed by the current study took the vaccine critical websites as a focus point. The actual readers of the websites were not taken into account in this study. A recommendation for future research is to take a closer look at the interaction between websites and vaccine hesitancy, and measure the actual effect they have on a population. Interviews with vaccine critical individuals, to find out if they visit these websites and how they use them, could provide insight in the relationship between vaccine critical websites and vaccine hesitancy.

Kata (2010) argues that positive information alone is not enough to combat vaccine hesitancy, as many anti-vaxxers are not persuadable by the provided information. Looking at the results of the current study, it becomes clear that arguments concerning the safety of vaccines is not the only thing that keeps anti-vaxxers busy. Going by the results of the current study, vaccine criticism is intertwined with alternative methods of medicine, and a broader mistrust of the government and pharmaceutical companies. These are not areas in which information about the safety of vaccines will help (Kata, 2010).

Conclusion

The content and design attributes present on Dutch vaccine critical websites have been identified, and can be used to guide future policy in combating anti-vaxxers. Most results of Dutch websites were comparable to those of English and French websites, however, the importance of conducting your own research was a sentiment found on many websites. Dutch websites carried this sentiment more than English or French websites. This is in line with more recent trends among anti-vaxxers. Social media has taken a more prominent role for vaccine criticism, as shown in this study. Future research should focus more on social media analysis, as well as including a broader set of cultures.

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Appendix 1.A.

Table A.1. The results of the analysis per theme and code used. On the left side are the results of the current study, the right side gives an overview of the results of previous studies.

Content Attributes	Total	Percentage	Wolfe et al, (2002)	Kata (2010)	Bean (2011)	Ward et al (2015)
Safety and Effectiveness						
Poisons	19	95%		100%	80%	94%
Idiopathic illnesses	20	100%	100%	100%	76%	
Immunity eroded	17	85%	95%	88%	32%	47%
Simultaneous vaccines cause adverse effects	5	25%	50%	38%	12%	29%
Hot lots	1	5%		38%		24%
Underreporting	5	25%	95%	63%	36%	41%
Disease decreases	7	35%	73%	88%	32%	
Trivial diseases	8	40%		50%		41%
Alternative medicine						
Alternative treatments	12	60%	70%	88%	20%	29%
Critiquing biomedicine	8	40%		75%	4%	35%
Implied debate	9	45%		38%	16%	71%
Back to Nature	11	55%		88%	24%	35%
Products for sale	5	25%		13%		
Civil Liberties						
Parental Rights	16	80%		75%	16%	
Monitoring	1	5%		25%		
Totalitarianism	5	25%		63%	20%	
Conspiracy						
		0%				
Profit	10	50%	91%	75%	52%	65%
Collusion	11	55%		63%	20%	
Protection	4	20%		50%		
Cover-ups	17	85%		75%	20%	82%
Rebel Doctors	15	75%		50%	4%	41%
Foolish Doctors	3	15%		25%		
Fear-Mongering	14	70%		50%	8%	
Unusual Theories	8	40%		38%	16%	38%
Privileged Knowledge	15	75%		50%	8%	
Anti-science	2	10%		38%		
Informed choices	16	80%		38%	24%	
Morality, Religion, Ideology						
Religious tenets	0	0%		25%		0%
Immoral acts	2	10%		38%		6%
Anti-utilitarianism	0	0%		13%		0%