When Facts don’t Work

Emotional sentiment in the Dutch Anti-Vaxx movement

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Abstract

Although vaccination has been regarded with scepticism and hesitancy since the first vaccines were introduced, the development of the internet into an interactive platform on which people can create their own information in combination with other societal factors have made the anti-vaxx movement both more vocal and effective. Possible causes have been explored as research in recent years has put more focus on psychological factors underlying vaccine hesitancy as the traditional method of simply providing more information seemed insufficient.

This study tried to add to this existing research by exploring a new type of data, taking the interactive nature of the Web 2.0 into consideration and by bringing in research on conservative movements that show similarities with the anti-vaxx movement. By using quantitative content analysis it explored if patterns that were previously identified were also present within the closed-off Facebook group of the anti-vaxx movement in the Netherlands and studied if negative emotions should be taken into consideration as emotional driver, identifying anger as an emotion of particular interest.

The results of the study showed that similar patterns and motivations were present within the closed-off Facebook group, but that people within in this group used less emotional content, engaging in more scientific debates instead. Furthermore, an analysis of underlying emotional sentiment showed that a negative sentiment was more often expressed than a positive one. Seed word analysis showed no indication of either fear or anger being the main emotional driver, but the negative sentiment and research on other movements indicated that further research should not only look into fear as underlying emotion but also take other emotions into consideration.
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Introduction

Anti-scientific thinking seems to be on the rise as more people question the scientific method to deliver unbiased results. Different movements have sprung up with beliefs that directly counteract the view held by a majority of scientists in a field. Some of them might be able to be seen as mere conspiracy theories that are ultimately held by a very small minority such as scepticism about the authenticity of the moon landing or the belief that the earth is flat rather than spherical. Others such as climate change denial are held by large group and have actual policy implications.

Conspiracy theories and scepticism have surrounded vaccination since its early adoption despite it being considered one of the most successful achievements of modern medicine by the scientific community saving millions of lives year through vaccination programs and helping to eradicate certain diseases like smallpox (Wolfe & Sharpe, 2002). Although the scepticism has been there since vaccines were introduced, the development of the internet has facilitated the transmission of these beliefs due to its popularity and pervasiveness: With people depending more on social media as source of information, turning away from traditional media has given people with these beliefs a chance to be more vocal, spread misinformation and to connect easier with like-minded people, while the opportunities for fact-checking and correction have been diminished (Kata, 2010, Lutkenhaus, Jansz & Bouman, 2019). In addition, Web 2.0 allows users to create and share content using social networks (such as Facebook, Twitter, Youtube or Wikipedia), so individuals can share their personal experiences of vaccination. These narratives add a new dimension to health information: a personal and embodied view of vaccine-preventable disease, vaccines and their potential (often negative) consequences (Dubé, Laberge, Guay, Bramadat, Roy, & Bettinger, 2013).

In these emerged internet communities, the traditional religious motives seem to play a less prevalent role. Motives for non-vaccinations seem to stem from a new-found view on health, individual decision-making and mistrust in authority (ECOM, 2015). Due to a recent drop in vaccination rates throughout the industrialised world over the last two or three decades and sporadic outbreaks of vaccine-preventable diseases, governments and the media have become more interested in the activities of this so-called ‘anti-vaxx movement’ (Blume, 2005). Governments suspect that the activities of these groups are focused on actively convincing others that vaccines are harmful to a person’s health (either their children or the person in question) and that this leads can lead to ‘vaccine hesitancy’, a more critical attitude towards vaccinations that can translate into omission of certain or all vaccines leaving children vulnerable for preventable diseases (Dubé, et al, 2013).
As governments are responsible for the health of the general population, the drop in immunisation rates has sparked both a social and a political debate in western countries, also resulting in political measures. To deal with a plummeting immunisation rate, Italy instituted legislation that bans unvaccinated children from kindergarten and nursery and fines parents of older unvaccinated children (BBC, 2019). Even more recently, Germany has passed legislation for mandatory vaccination against measles. This legislation will take effect in spring next year and institutes heavy fines for partners that do not comply (Eddy, 2019).

Observing the political steps taken in other countries and having the same drop in immunisation rate, the debate concerning vaccination has been prominently in the news in the Netherlands (NOS, 2019; NOS, 2019; Herderscheî, 2019; Giesen, 2019). There have been both propositions for governmental interference following the examples of Italy and Germany and a call for researchers to uncover possible causes for the drop in vaccination rate. Interestingly, the Dutch government has specifically identified the anti-vaxx movement as a possible cause of the drop in immunisation rate and has actively tried to promote vaccination together with several governmental institutions (GGD, RIVM) and medical professionals. Traditionally solutions were sought in providing more information and educating better, but slowly the realisation has that only providing more information will not be sufficient. Instead, the question becomes more and more about what motives people have who reject vaccination.

This research studied these motives and uncovered patterns within the closed-off Facebook group that formed a central part of this movement in the Netherlands. Found patterns and motivations were compared with results of previously done research. The analysis centred around the following research questions with RQ 3 being contingent on the previous two questions (If discussion does not contain emotional reactions and does not express a mainly negative sentiment, the conclusion would that fear and anger are probably not main driving emotions):

RQ 1: Does discussion within the closed-off Facebook group of the anti-vaxx movement in the Netherlands centre mainly around emotional or non-emotional content?

RQ 2: Does discussion within the closed-off Facebook group of the anti-vaxx movement in the Netherlands express a mostly positive or negative emotional sentiment?

RQ 3: Is fear or anger the main driving emotion behind discussion within the closed-off Facebook group of the anti-vaxx movement in the Netherlands?

Before going deeper into these questions, I will first explain why a drop in immunisation rate is problematic from both a political and societal perspective and give an overview of the anti-vaxx
movement in the Netherlands. I will also provide a summary of previously done research on internet groups (as most of the anti-vaxx group activities are found online) and possible motivations behind rejection of vaccines including possible emotional drivers that underly these motivations.

Problems with Dropping Immunisation Rates

While complete immunisation of the population would be preferable in theory, in practice this is an impossible goal. Part of the population can simply not be vaccinated due to other health related issues. This vulnerable group of people relies on so-called ‘herd immunity’ to prevent them from attracting diseases. Herd immunity is based on the principle that if enough people are vaccinated a disease has not enough hosts to spread among the population. Herd immunity therefore protects even the small group that is not immunised. However, for herd immunity to work a majority of the population needs to be vaccinated. This means an immunisation rate of at least 90% for most vaccines (Sadaf, Richards, Glanz, Salmon & Omer, 2013). A drop in immunisation rate is therefore detrimental for the ‘herd immunity’ and can seriously endanger more vulnerable groups of the population. As vaccines also help to eradicate diseases by not providing them enough hosts to spread and survive, a drop in immunisation rate can also result in an resurgence of these diseases (Hak, Schönbeck, De Melker, Van Essen & Sanders, 2005).

As scepticism and objections towards vaccinations are not a new phenomenon the impact of the anti-vaccination movement seems to persuade a new group of parents to abstain from vaccinating their children pushing the immunisation rate to concerningly low levels throughout the western world. The importance of herd immunity and the danger that diseases pose for an unprotected group makes it a difficult political question that differs from other communal issues. In the case of vaccinated a small (but arguably vocal) minority that does not want to vaccinate their children cannot simply be ignored. This poses a difficult choice between the government’s task to ensure its citizen’s wellbeing and its task to protect citizen’s freedom (of choice).

The Anti-Vaxx movement in the Netherlands

The Netherlands has had a declining vaccination rate for three successive years with only a stabilisation of the rate in 2018 (RIVM, 2019). Although the Netherlands has group of people that do not vaccinate due to religious motivations this community has remained stable (ECOM Report, 2015). The government is therefore convinced that the more recent decline in vaccine hesitancy and vaccination rate has been due to the anti-vaxx movement spearheaded by organisations like the NVKP (Nederlandse Verenging voor Kritisch Prikken (Pierik & Verweij, 2019, 2019, Staatssecretaris Blokhuis, 2018). Other studies also suggest that the motivation to not vaccinate among Dutch parents is not religiously motivated but seems to be motivated more by anthroposophical thinkers.
that belief in the self-healing properties of the human body instead of modern medicine, and conspiracy thinkers. The conspiracy that is most prominent in the anti-vaxx movement is the ‘Big Pharma’ conspiracy. This conspiracy believes that the government, researchers and pharmaceutical companies are all conspiring together and manipulate facts and statistics to make more money or control people (Paulussen, 2005; Das, 2019; Mollema et al., 2012). Unfortunately, there seems to be no exact numbers on the make-up of the anti-vaxx movement in the Netherlands. The preliminary analysis of Facebook posts and comments, however, has showed no indication that the reason for vaccine hesitancy within this group is religiously motivated. The analysis of the Dutch vaccination debate on Twitter by Lutkenhaus et al. (2019) also supports this assumption.

Previous Research

Societal factors and the Internet 2.0

As mentioned before there have been objections and scepticism towards vaccination. However, the number of people that refused vaccinations (usually based on religious or moral objections) had been stable until recently (ECOM, 2015). It is important to realise that this recent uptake of vaccine hesitancy has been impacted by societal and technological developments. Especially the further development of the internet towards the ‘Web 2.0’ has brought more tools for information gathering and information creation. Additionally, it has created a platform on which anti-vaccination sentiment can thrive.

A large part of the research that explores the possible causes of the vaccination movement looks towards the development of the Internet or what has been called ‘the internet 2.0’ as much of the vaccination movement presence is online. The internet 2.0 gives the possibility to not only retrieve information, but also create information. Due to amount of information that is generated the process of verification has become complicated; anyone can pretend to be an expert or possess knowledge about a certain subject (Betsch, Brewer, Brocard, Davies, Gaissmaier, Haase, 2012). Here has been made a link to the traditional media as they try to uphold a certain standard and are usually under a certain amount of scrutiny or even legal obligation to retract false statements, information on the internet is not being held to the same standard. The anonymity of the internet makes scrutiny of sources also more complicated and issues of free speech limits government’s ability to censor information even if this information is incorrect. This creates a situation in which it comes people’s own responsibility to judge if they either trust or mistrust a source. Studies research the online presence of the anti-vaxx movement online (Kata, 2010; 2012, Lutkenhaus, Jansz &
Bouman, 2019) find evidence that anti-vaxx communities are rooted in a post-modern worldview that distrusts traditional institutions and favours personal narratives over scientific evidence. Moreover, the study by Lutkenhaus et al shows that majority of messages coming from the anti-vaxx movement or at least the groups this movement seem to consist of (conspiracy thinkers and homeopathy advocates) are negatively phrased.

Although the general population is higher educated than in the past. Giving people more tools to comprehend information, higher education also fosters a critical attitude. This in itself should not be harmful, but in combination with a new availability of information it can give rise to an unhealthy form of scepticism (Hak et al. 2005).

The internet and the availability of information has also changed the relation between patient and healthcare professionals as everyone has access to information that was restricted in the past. Where in the past the medical professional was seen as an authority figure in his or her field and a certain amount of trust was put into the professional when it came to making medical decisions, this dynamic has changed drastically (Betsch, 2011). The patient has now become an ‘expert’ in its own right due to access to this information, however without the training or general knowledge that the medical professional possesses. Medical treatment is not seen as a procedure in which the professional is the sole authority figure, but as a dialogue between the professional and the patient to come to a solution. The communication between patients and healthcare professionals can also be a factor that has a negative influence on vaccine hesitancy as parents often perceive that they are being judged if they voice their concerns about vaccines to healthcare professionals (Krijnen, 2014). The shocked reaction from healthcare professionals if a parent is hesitant to get their child vaccinated and their assumption that parents will ‘go along’ with the regular vaccination schedule makes it seem to some parents that their freedom of choice is being denied. The tendency to assume that parental doubts had no basis in facts and therefore did not merit serious consideration only helped to strengthen this feeling in hesitant parents.

The internet has also made it easier to connect to like-minded people, not only domestically but also abroad. Especially social media and social websites such as forums have played a major role in establishing these connections. Although facilitating discussions between like-minded people is not harmful in itself, it becomes more problematic if people only use a limited amount of information resources (Dubé, Vivion & MacDonald, 2015). Closed-off Facebook groups run into the risk of becoming ‘echo chambers’ in which the same argumentation and reasoning is being repeated without giving voice to dissenting viewpoints (Lutkenhaus, 2019). As research shows that people get most of their news from social media, people run into the risk of creating an information bubble for
themselves, especially because most social media employ an algorithm that produces information based on your preferences. This information bubble implies that you will never encounter information that challenges your viewpoint.

Although the traditional media might in general be a more reliable source of information, they also help to strengthen a negative viewpoint of vaccination. A general tendency for media to focus on sensationalism and conflict leads to an overexposure of negative consequences while ‘normality’ is underexposed (Chiou & Tucker, 2018). In the case of vaccines this means that the benefits and positive effect of vaccinations are rarely mentioned. Research suggest that vaccine acceptance suffers from ‘pyramid effect’ (Poland & Jacobsen, 2001). In this theory the base of the pyramid is represented by majority that benefits from vaccination but is unaware of this effect as they will not attract the disease. The top of the pyramid is a very small minority that suffer harm or perceived harm from vaccinations. In contrast to most silent beneficiaries the effect on this minority is perceived as severe, acute and harmful. As such this pyramid effect can lead to an unbalanced view on the effect of vaccines if this minority becomes increasingly more vocal than the silent majority, using both the traditional media and internet to vent their displeasure. This unbalanced view also plays into more individualistic factors such as recency bias or overestimation of risk that we will discuss further on.

Furthermore, the effectiveness of vaccination might harm its reputation, especially if the positive effect of vaccination is underexposed. As mentioned, vaccines can not only protect a current generation of becoming sick, but if immunisation rates are high enough it can lead to the eradication of a disease. There are multiple examples of diseases that in the past would infect large parts of the population that are now mere nuisances or completely eradicated in western countries. However, this eradication (or near eradication) of disease has as downside that it lowers our perception of the threat that this disease poses. This dilution of threat encompasses a paradoxical phenomenon in which critical views about the necessity of the vaccine are more likely to arise when less people get sick and the disease is less perceived as an immediate threat. Thus, this paradox will reduce a fear reaction when diseases are mentioned.

**Motivations behind Vaccine Hesitancy**

As mentioned before vaccine hesitancy has been an issue since the introduction of vaccinations and therefore interventions to combat vaccine hesitancy and raise the confidence in vaccinations have also been ongoing effort. Traditionally, most interventions centre around the so-called *Information Deficit Model* (IDM). Reasoning behind this model is that humans are rational beings and that a
refusal to accept presented scientific evidence is solely based on a lack of information to come to a rational decision. The solution and interventions are therefore focused on providing hesitant parents with more scientific facts to fill the ‘knowledge gap’ and counteract their hesitation (Rossen, Hurlstone & Lawrence, 2016). Intuitively it seems like a likely solution, especially because of widespread myths and misinformation that surrounds vaccines. In practice, however, there seems to be several problems. First, knowledge rarely seems to be a good predictor for vaccination acceptance with research even showing that providing people with more scientific information can work counterproductively (Sadaf et al., 2013). Also, the question arises what kind of information should be provided. Is it more useful to provide parents with information on how vaccines might impact the health of their own child or is highlighting the societal importance of vaccines (herd immunity, risk groups) a more effective approach?

The notion that a lack of knowledge is the main reason behind vaccination hesitancy is further disproved by the fact that a large part of the parents that are sceptical towards vaccination are higher educated diseases (Hak, Schönbeck, De Melker, Van Essen & Sanders, 2005). This would imply that these parents would be more skilled in reading scientific information and in separating sound scientific data from faulty and flawed research.

If a lack of knowledge is not the main drive, what motivates parents to forgo important medical interventions to prevent their children from attracting life-threatening diseases? Previous research establishes that both pre-existing beliefs and so-called ‘mental heuristics’ (Kendrick, Cohen, Cialdini & Neuberg, 2018) can interfere with rational thought and that people do not only take factual information into consideration in their decision-making process (Reyna, 2011). Understanding these non-rational factors can help to understand what motivates people to not vaccinate and might assist to tailor policies or interventions designed to stimulate more acceptance of vaccines. Below I will outline the previous research on mental heuristics and pre-existing beliefs that might interfere with rational decision-making within the anti-vaxx movement.

**Mental Heuristics**

Research looking specifically for the interference of mental heuristics (Kendrick, Cohen, Cialdini & Neuberg, 2018) identify several cognitive biases that interfere with people’s acceptance of scientific research and enable anti-science thinking. Conformation bias, a mental heuristic that leads to people paying selective attention to information that reinforces their beliefs, while neglecting or paying less attention to information that is contradicting. This selective attention emboldens people in their beliefs and makes it harder to persuade them of dissenting viewpoints. This bias specifically interferes with the traditional method of combating vaccine hesitancy by just providing more
information. If this scientific evidence contradicts existing beliefs it might be dismissed more easily. Cognitive efficiency is a heuristic that causes people to tend to oversimplify or fall back on earlier thought patterns when they are face with an overload of information. Again, presenting more information as a solution might have an adverse effect due to this bias as people might feel like they are overwhelmed by information.

Additionally, other factors might also be involved in the individual decision-making process (Meszaros et al., 1996). Factors such as omission bias (a bad outcome is worse if it occurred due to an active choice to do something rather than as a consequence of not doing something) and free-loading (as long as everyone else gets the vaccine, there’s no reason for me to get it) are additional factors for vaccine hesitancy and non-immunisation. However, altruism (I should get vaccines to protect others too) and band-wagoning (I get vaccines because it seems like everyone else does) can actually help to get more people to follow the regular vaccination schedule.

Pre-existing Beliefs

Previous research states that it is intuitive to base our decisions on our general attitudes, the general concerns, myths and beliefs that people hold towards vaccines, but that these attitudes are merely the tip of the iceberg (Hornsey, Harris & Fielding, 2018). A factor that might interfere is general belief in conspiracy theories that appears to increase suspicion about vaccine safety and increase feelings of powerlessness and disillusionment, whilst decreasing trust in authorities, which in turn introduce reluctance to vaccinate (Jolley & Douglas, 2014). The most prevalent narrative in the anti-vaxx movement being the notion of ‘Big Pharma’, a theory that sees vaccines as a ploy by a conglomerate of pharmaceutical companies to enrich themselves (possibly in cooperation with the government). Anti-vaxxers might also have a more inherent trigger of a disgust reaction towards medical procedures, especially when it comes to needles, blood and hospitals. This inherent disgust reaction can fuel their notion of vaccines as something negative and can lead to strengthening attitudes that gives them permission to avoid these triggers. People in the anti-vaxx movement also show high levels of reactance or in other words, an attitude that communicates to others and yourself the type of person you would like to be. As these people have established themselves as a nonconformist; someone who is sceptical of consensus views and intolerant of people telling them how to think. This can lead to rejection of consensus views as a short-hand way of communicating a nonconformist identity to the self and others.
Research also outlines the importance of trust to explain why more reliable sources are disregarded, while others, arguably less credible sources are embraced (Yaqub, Castle-Clarke, Sevdalis & Chataway, 2014). Waning trust is a problem on multiple levels when it comes to vaccinations. The trust in medical professionals as ‘medical authority’ is one level. Another level is the trust in the government and the scientific community. Linked to the conspiratorial belief about ‘Big Pharma’ trust in government also wanes, because of perceived government control (Streefland, Chowdhury & Ramos-Jimenez, 1999) This waning trust in authorities and the government causes scepticism and distrust in information that comes from these sources. This ties into the last level, which is the trust in traditional media. Especially with calls of ‘fake news’ in more recent years, the traditional media are also observed as being only a mouthpiece of other institutions that in turn are not trusted. This effect is increased as other sources clamour to not trust the traditional media outlets and frame narratives about how these media outlets are pushing a ‘pro-vaccine’ agenda without showing the other side.

This trust also plays a role in risk perception as people will weigh both the risk of attracting the disease and the risk of suffering a side-effect from a vaccine that might lead to adverse event avoidance based on the risk assessment of either adverse effect. This risk assessment is not only influenced by the content of the information, but also a result of how and by whom this information is provided (Betsch, 2011).

Furthermore, there is a growing trend of parents that see vaccination as a personal trade off regarding what is good for their health and the health of their children. This trend is particularly apparent among parents with alternative views regarding health and illness. Various studies (Ernst, 2002; Nasir, 2000) confirm that a negative sentiment towards vaccination is especially common among practitioners of some forms of alternative medicine (at least in Europe).

Underlying Emotional sentiment

So far, I have outlined previous research that focuses on mental heuristics and previously held beliefs and how they interfere with rational decision-making. As particularly research on the anti-vaxx movement (Betch et al., 2011; Kata, 2012) identify that emotional content makes up most of the content of vaccine critical sources it seems, however to also look into emotion sentiment that might underly the previously outlined beliefs. It is important to identify which emotions might play a role in this aspect and to identify how they might impact decision-making within this movement.
Previous research on the anti-vaxx movement seems to leave a gap when it comes to emotional sentiment that lies behind motivations, but it has not been completely neglected. Research by Betsch, Renkewitz, Betsch & Ulshöfer (2010) and Betsch & Schmid (2013) studied the effects of fear within this movement. According to this research fear is the main emotion underlying anti-vaccinations attitudes and decisions as it nullifies cognitive and level-headed consideration about vaccinations. Fear is an emotion that emerges as response to threat. Fear of vaccinations can be a response to several different threats: A threat to health of oneself or one’s child (either by the vaccination itself, possible side-effects or an illness), a threat to self-determination (especially in case of mandatory vaccination) or a perceived threat of either the government and/or ‘Big Pharma’ (linking threat to conspiratorial beliefs). Research by Betsch et al. (2010, 2013), however, is limited in its conclusions as both studies look into fear reactions to different threats. Moreover, these studies focus on fear as the driving emotional factor but do not identify fear as the sole driver.

Although fear seems to be sensible emotion to study in the context of vaccination hesitancy due to presence of real and perceived threats, research that is not specifically focused on the anti-vaxx movement shows that other emotions might also impact rational decision-making. According to Huddy, Feldman & Cassese (2007) negative emotions (like fear) are linked to avoidance of aversive stimuli designed to protect against harm and negative consequences, whereas positive emotions encourage behaviour that leads to rewarding stimuli (two-dimensional valence model). Huddy et al. (2007) state, however, that it might prove difficult to isolate specific effects for separate emotions as observable behaviour might be similar, even when the driving emotion might differ.

Despite this statement Huddy et al. (2007) make a clear distinction between the effects of fear and anger as both are negative emotions but have distinctly different cognitive and behavioural outcomes. Anger is, in contrast to fear, linked to behavioural approach, or in other words, actively engage with the subject of their anger, instead of the avoidance that should be associated with a negative emotion according to the valence model. Anger also has links to distinct cognitive outcomes that lead someone to action: less careful and systematic processing of information, diminished perception of risks and a greater tolerance for risk-prone behaviour. Evidence also suggest that angry people, in general, may be faster to arrive at a decision and take shortcuts to do so, making them more prone for mental heuristics. Fear fits into the predicted valance model leading someone to avoidance behaviour. The cognitive processes that fear triggers also lead to someone to this behaviour: heightened sensitivity and attention to threat, overestimation of risks and more careful information processing. It also diverts attention to threatening stimuli and increases
cognitive preoccupation with threatening sources, shifting attention and resources away from nonthreatening stimuli. Due to this diversion, fear can be detrimental in tasks involving memory, although it can also improve limited cognitive functions when it comes to detecting additional threat (Eysenck, 1992, Macleod & Mathews, 1988).

Fear and anger are also studied in the context of conservative movements (Jost et al., 2003). This literature is relevant as anti-scientific sentiment can be seen as the stem from which anti-vaccination sentiment branches. Although there is a lack of evidence (ECOM, 2015) suggesting that anti-vaxxers are more conservative (they might even have more liberal tendencies) there might be parallels on how fear and anger impact decision-making in both groups.

Research on conservative political movement led to a distinction that some conservatives have a right-wing authoritarian personality that triggers certain conservative responses. Fear is a major factor that impacts how people with this personality trait react to the world. People with an RWA-personality are primarily scared as in their mind the world is a dangerous place. Interestingly, this fear does not have the retreating effect outlined by Huddy, but instead instigates aggression in them (Altemeyer, 1998). Moreover, RWA’s believe they have the moral high ground over others. This self-righteousness helps to justify aggressive impulses and act out fear-induced hostilities. It seems like a conservative mindset also makes someone more susceptible for fear.

Research also indicate that authoritarians are more responsive to threatening or negatively framed persuasive messages than messages that are more positively framed. The effect of these messages was found to carry over into behavioural intentions and behaviour (Lavine et al., 1999). Although measured in voting behaviour in this instance, it indicates that negative messages could translate into an intention to not vaccination and skipping vaccinations, especially as indicated before that a majority of communication within the anti-vaxx movement expresses a negative sentiment (Lutkenhaus et al, 2005)

A last possible effect of fear is mortality salience, the act of making people aware of their own mortality. Research (Greenberg et al., 1995) suggests that this realisation of mortality leads people to defend culturally valued norms and practices to a stronger degree. It also increases stereotyping behaviour and aggression towards those who violate the previously mentioned norms. This could be a factor in why fear-appeals towards parents that consider not vaccinating their children have not been effective; Fear of potentially deadly illnesses might make anti-vaxxers cling more to their held beliefs and judge parents that pro-vaccination even more harshly.
Methods

The overview of previously done research shows that traditionally the belief was held that vaccine hesitancy was caused by a lack of knowledge or education and that it therefore could be solved by providing more information. Other research on the anti-vaxx movement indicates, however, that there are multiple factors that interfere with rational decision-making within this group and help explain why people are hesitant towards vaccines. Mental heuristics interfere as our brains take mental short-cuts making it difficult to objectively judge information. The development of the Web 2.0 has facilitated the spreading of deliberate misinformation while simultaneously providing more anonymity and less scrutinization. Meanwhile, trust in traditional institutions such as the media and the government has waned while more credit is given to conspiracy theories. Underlying these motivations are emotional drivers that influence rational thinking. The research by Betsch and colleagues (2011) showed that fear could be driving emotion within this movement. Research on other movements, however, seems to point that also anger is worth investigation.

As shown in the previously mentioned studies, studying the anti-vaxx movement usually involves studying online communication as most of this movement exists online. These studies, however, focus on a more traditional use of the internet, namely just as a source from which people draw information instead of an interactive medium in which information is exchanged and in which direct interaction with an information source is possible. Previous studies have only used Twitter posts and vaccine-critical websites as data points arguably adhering to a more traditional view on the internet. This outdated view leaves a gap in the research that this study tries to partially fill in. As the Web 2.0 serves as a platform on which everyone can be create information it also provides an opportunity for us to study interaction within members of the anti-vaxx movement. Taking this to account, I decided to use an interactive medium, namely Facebook, as a dataset and focus specifically on comment sections as a means to study interaction between members of the anti-vaxx group. I will outline my choice of case selection more elaborately below.

Case Selection

As a case this study selected the anti-vaxx movement in the Netherlands. As a mostly non-religious country, 53% of Dutch people does not identify themselves as religious especially the younger generation (CBS, 2018). This implies that a large majority of people within the anti-vaxx movement within the Netherlands do not have religiously motivated reasons to not vaccinate, making it easier to weed out these responses which are not relevant for this study. The Netherlands is also a good case to study as the debate around decreasing vaccination numbers and its dangers have sparked a fierce conversation both in the media and in politics with politicians (NOS, 2019; NOS, 2019;
Finally, the Dutch case is also convenient as there is no language barrier for me. Working with my native language makes it easier for me to interpret responses and catch subtle intricacies that I might have missed working with sources in a different language.

For the study I initially chose to work with the closed-off Facebook groups of the main anti-vaxx organisations in the Netherlands identified by the government scepticism (website of ‘rijksvacinatieprogramma’). These organisations are 1) VaccinVrij (Vaccin Free), 2) de Nederlandse Vereniging Kritisch Prikken (Association for Safe Vaccination) and 3) de Vaccinatieraad (Vaccination Council). Unfortunately, the Vereniging Kritisch Prikken has no closed-off group and the group of de Vaccinatieraad has only ± 500 members. The main resource therefore was the closed-off Facebook group of Vaccinvrij as this group had by far the most members (± 30,000). Although emotional content has been studied before in previous research, it has only analysed websites and resources provided institutions, but never at the responses of people within this movement. The findings of previous research that emotional content is the most prevalent resource used by this movement indicates that the decision to vaccinate or not is a very personal one. This study therefore used individual reactions within a closed-off Facebook group and the interaction between people in the comment section as previously unexplored resource. This would be a useful addition to this research field and help to broaden our understanding of what emotions play a role in making this decision.

Using closed-off Facebook groups also allowed me to study reactions of people within this movement in a ‘safe environment’, making them more authentic. As these groups are not publicly accessible and consist of like-minded individuals, people are likely to more honest and forthright with their opinions and feelings than they would be in a more public environment in which they would be more guarded fearing judgement or critique from others.

Methodology

Using social media poses a challenge as it usually entails vast amount of data. Therefore, utilizing external software to analyse the quantitative aspects of the comment section or to extract or mine data from social networks can be very helpful (Felt, 2016, Dennis & Bower, 2008). Facebook just like other social media platforms has, however, become more restrictive in allowing external software to analyse and extract data directly from its website as privacy of its users has come more to forefront (Feltman, 2016). Moreover, external tools can only extract data from Facebook pages that are public due to Facebook’s privacy restrictions. As this study used closed-off/private Facebook groups as its resource the use of datamining software to extract useful data is not possible. The option left was to
manual extract data, which comes with the downside of not being able to include all the posts due to the sheer amount of available data and due to time restrictions.

Although mainly conducting a quantitative content analysis, for the recognition of patterns it is still vital to systematically examine the Facebook comments not only targeting the content of material, but also the formal aspects and latent meaning. This means it was important to maintain a systematic nature without losing valuable context (Mayring, 2004).

Preliminary Analysis

To start the coding process, I did a preliminary analysis of posts in the ‘VaccinVrij’ Facebook group. Categorisation was necessary as analysis of comments will be dependent on the content of the original post. The initial method was to separate emotional/personal posts from ‘scientific’ or non-emotional posts. The preliminary analysis, however, showed more similarities and common themes to justify more categories. These categories flowed from my inductive research into these Facebook posts and from the common narratives and tropes identified by Kata (2012).

As multiple studies suggested that most of the communication in the anti-vaxx movement consist of personal anecdotes (Kata, 2012; Betsch et al., 2012). This conclusion seems to be reflected in the sample that was drawn. The first category therefore consists personal stories (PS). These stories consisted of photos of children or detailed personal anecdotes. These personal experiences were both positive (showing that non-vaccinated children are healthy) or negative (experiences with side-effects or illnesses).

The next common theme that was found in the preliminary analysis was posts about conspiracy theories or debunking or ridiculing ‘pro-vaxx’ information. This seems to fit with the assumption in previous research that conspiracy thinking is prevalent in the anti-vaxx movement and the assumption that information from the pro-vaccine side is usually not believed (Hornsey, Harris & Fielding, 2018). This category included posts that deal with government critique and conspiracies concerning indoctrination by the government or ‘Big Pharma’ (GC). It also included posts that post ‘pro-vaxx’ information for the purpose of ridicule and mockery.

The third category concerns posts that present scientific evidence or reports about the dangers of vaccines (SE). Usually this either concerns reports about the substances that are present in vaccines and how these substances impact our health or concern reports debunking theories of the ‘pro-vaxxers’ such as herd immunity or immunisation.

The last category deals with medical advice (MA). Although the statement on the Facebook page of ‘Vaccin Vrij’ states that this page is “not meant for medical advice”, a large amount of posts are
parents that ask for specific medical advice. This medical advice does not exclusively relate to illnesses that a child can be vaccinated for, but can also deal with questions about general health, vitamin intake or questions about other medical procedures. Other posts did not fall into any of the categories and concerned information that is neutral like invitations to specific anti-vaxx events.

Although these categories are created inductively based on the discussed theory I expected that commenters would have a stronger emotional reaction to posts that are classified as personal stories and conspiracy theories, while the comment section below the other two categories is expected to generate a more ‘scientific’ discussion. Also, following the research on conservative movements comments below posts about conspiracy theories might express more anger sentiment than posts from the other categories.

The preliminary analysis resulted into a sample of 250 different posts in which not one category was overly represented. The results are summarised below.

<table>
<thead>
<tr>
<th>Sample of 250 from the ‘Vaccine Vrij’ closed Facebook group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Stories (PS):</td>
</tr>
<tr>
<td>Scientific Evidence (SE):</td>
</tr>
<tr>
<td>Medical Advice (MA):</td>
</tr>
<tr>
<td>Government/Big Pharma Conspiracy (GC):</td>
</tr>
<tr>
<td>Unrelated:</td>
</tr>
<tr>
<td>41</td>
</tr>
<tr>
<td>58</td>
</tr>
<tr>
<td>57</td>
</tr>
<tr>
<td>64</td>
</tr>
<tr>
<td>30</td>
</tr>
</tbody>
</table>

Main Analysis

As I am interested in the reactions and comments on these posts I needed to select posts that have created enough discussion and reactions to be useful for analysis. This also ensured that the posts were representative for the categories and can therefore serve as reliable date points to generalise any conclusions. To observe differences in comments on different posts, posts from each category needed to be selected. The preliminary analysis showed that popular posts in this group generate 50 comments or more. This definition of a popular post was chosen inductively based on the amount of comments that posts generally generated in this group, essentially including all comments that generated ‘above average’ comments. The amount of comments ranged from zero to 100 with outliers to 200+ comments. Preferably, I would have had an overview of all the available posts (posts made since creation of the group April 2012, estimation of 5000+ posts in total) and picked the posts with the most comments for each category. Unfortunately, due to limit access to the private group as a regular member it was impossible to get a good overview of all the different posts. An admin of the group might have supplied me with this information, but as I suspected the admins of the group would not look favourably on my research in their group and I therefore would run into the risk of
being evicted from the group, I decided to determine a timeframe and manual select the most popular posts.

The following step was to analyse the comment section of these posts. Comments can be used as reflection of the emotional state of the commenter. I used an adapted version of the model developed by Roberts et al. (2012) to analyse emotional response on twitter, which is based on Ekman’s six basic emotions (Ekman, 1972). Using this model entails categorising emotional responses into expressing either a positive or negative sentiment. This is followed by pinpointing a specific emotion. Studies (Scherer, 2005; Aman, 2007), however, show the difficulty in categorising emotions purely on a textual basis and exactly pinpointing the right emotion, especially when it is not explicitly expressed through so-called seed words. An example of this would be a statement like ‘I am angry’ in which ‘angry’ is a clear seed word that expresses the emotion (Kim, Bak & Oh, 2012). Based on the previous research fear and anger seem to be possible emotions that drive decision-making within this movement and are therefore the main focus in this research.

Ideally, I would have provided a comprehensive list of all the seed words that indicate fear or anger. However, a comprehensive list of seed words is to my knowledge not available in Dutch. As translating a complete list of English seed words to Dutch is unfortunately not possible within the scope of this research, I chose to use a list of the most common seed words in online communication identified by Shelke (2014) for anger and fear. I have strictly identified comments as fear and anger responses when they contained any of these seed words or derivatives of these words like greedy (seed word) – greed (derivative). Comments were identified as fear or anger if they explicitly used emo’j’s or expletives that indicated an obvious emotional state. These comments were always quoted in the analysis section with an explanation on why they were classified as such.

<table>
<thead>
<tr>
<th>Most common seed words in online communication identified by Shelke (2014) with Dutch Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anger</strong></td>
</tr>
<tr>
<td><strong>Fear</strong></td>
</tr>
</tbody>
</table>

Seed words can be deceptive, however, as a comment can also be ironic or sarcastic. It is therefore necessary to look at each comment individually to determine if the comment really expresses the emotion which the seed word indicated. Moreover, comments might have a mix of multiple emotions by combination of seed words for different emotions being present in the comment.
Therefore, I also introduced a classification of comments labelled ‘mixed emotion’. This mixed emotion can still express a negative or a positive sentiment but might also be a combination of both a negative and positive sentiment.

Following my research questions, I first wanted to check if emotional content is more present than non-emotional content by first 1) checking if a comment is either emotional or non-emotional, followed by 2) if the comment expresses negative or positive sentiment. Categorising negative or positive sentiment in a sentence should be relatively accurate according to research (Hancock et al, 2007). Comments classified as mixed emotion express both a negative and positive sentiment and were discussed individually if they were of particular interest. Expected was that the majority of comments would express a negative sentiment following the findings of Lutkenhaus et al. (2019). Furthermore, some comments were classified as non-related. This concerned comments that could not be classified as one of the other categories. An example were comments that only consisted of a nametag.

The comments expressing a negative sentiment were then examined more closely for seed words expressing fear or anger as I expected these to be the most prominent emotions. These emotions might be triggered by different factors e.g. conspiracy theories or fear for vaccines and possible side-effects. Every comment was studied individually to include an analysis of both substance (what is said) and tone (how it is said) to more accurately classify the comments and prevent accidental errors in classification due to sarcasm or irony. Expected emotions varied depending on the sort of post, although I expected the majority of the comments to express a negative sentiment.

In the analysis I used quotations of the comments. These comments will be translated into English from Dutch as the main audience of this paper is not Dutch. Special care will be given to keep the spirit of the comment as close to the original in the translation as well as retaining the syntax of the original comment. This includes retaining grammatical errors (when possible), emphasis through the use of capital letters and the use of punctuation marks.

Due to the amount of posts in the Facebook group of ‘VaccinVrij’ a timeframe of one month was established to draw a sample (November 2019). Other timeframes were considered such as a longer period or a timeframe starting at the date of a relevant event. Unfortunately, I did not find an event to justify the start of a timeframe. From all the posts in this month 54 post generated more than 50 comments and can therefore be labelled as popular posts that were useful for this analysis. These posts were categorised according to the previously established categories which showed that the majority of posts were either personal stories (PS) or medical advice (MA). As the comment section
will be a reaction to the original post these categories provide a frame of reference (what kind of post is it? What was its goal?) to the post. A different kind of post will most like elicit different emotions in the comment section. The comment section of the most popular posts from each category will be analysed below in further detail.

Analysis

Personal story

Post 1

The most popular post that was labelled as a personal story was a story by a mother that showed two pictures of her unvaccinated children and told her story of how she went to the consultation office to make official that she would not vaccinate her children anymore. According to the poster, her eldest child was fully vaccinated and she could clearly see a difference between her eldest and the two youngest children (that were on the pictures). She states that she is very happy with her decision. It is surprising this post generated the most comment as most personal stories that are posted in this group usually have a more negative sentiment and focus on the dangers of vaccination or anecdotes about bad treatment by ‘pro-vaxxers’.

The positive nature of this post, however, signals that this group functions not only as a source of information, but also as a group in which parents that do not vaccinate their children can find support. The analysis of the comment section reflects this sentiment with most posts expressing a positive sentiment. The majority of commenters react to the pictures, giving the poster compliments about her beautiful and healthy-looking children. Many commenters also remark that they have similar experience with their children and that you can ‘really see the difference’ between vaccinated and unvaccinated children. This positive sentiment is both expressed in seed words that signal positive emotions like beautiful, gorgeous, happy and healthy, but is also often expressed through heart, thumbs-up or heart-eyed emoji’s.

“What a beautiful children...Keep it this way mama 🌸”

“suppppper beautiful children”

“Bless you!!! Wow, that look in those eyes...Fantastic. You really see the different, I think.”

Although some comment showed a negative sentiment, no comments in this comment section could be clearly qualified as expressing fear or anger. The comments that express a negative sentiment all
centre around how anti-vaxxers are treated by doctors and how doctors play down the effects of vaccines. Although fear and anger can be factors that influence these statement, no clear seed words are found to indicate either.

One comment asked for further examination as it did contain a seed word for fear. It was comment that was written as reaction to another commenter stating that she was considering not vaccinating her child anymore. It states:

“I think you are still afraid somewhere for the diseases. If you just look up a lot of information about those and you get to trust that your child will get through them well, it might persuade you to not vaccinate as well.”

Although this comment does contain the word afraid which can function as a seed word signalling fear the comment as whole seems to express a more positive sentiment, especially when placed in the context of other comments that are made in this reaction to the original comment which also express a positive sentiment giving the commenter tips on how to gather information and deal with questions from doctors and ‘pro-vaxxers’ The comment was therefore not labelled as expressing fear.

<table>
<thead>
<tr>
<th>Post Description:</th>
<th>Personal story by a mother accompanied by two pictures of her children.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post:</td>
<td>This morning I went to the consultation office to make official that I will not vaccinate these two below (1 and 2 years old) They did not try to persuade me, but didn't agree fully either, it's your choice they said...My 8-year old son is fully vaccinated and I definitely noticed the difference, he also had respiratory arrest shortly after the vaccination (it couldn’t be caused by the vaccine the doctor said) and he was ill all the time. My other two children, unvaccinated, are almost never sick if they have cold it only takes 2 days. I think their resistance is just so much stronger I notice that with everything, so happy I did not let myself be persuaded by none one 😊Proud😊</td>
</tr>
<tr>
<td>Date:</td>
<td>8th of November 2019</td>
</tr>
<tr>
<td>Number of Reactions:</td>
<td>681</td>
</tr>
<tr>
<td>Number of comments:</td>
<td>198 comments</td>
</tr>
<tr>
<td>Number of Emotional comments:</td>
<td></td>
</tr>
<tr>
<td>Total of Positive Comments</td>
<td>166</td>
</tr>
<tr>
<td>Total of Negative Comments</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Fear</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Anger</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Mixed Emotion</td>
<td>4</td>
</tr>
<tr>
<td>Number of non-emotional comments:</td>
<td>18</td>
</tr>
<tr>
<td>Non-related Comments</td>
<td>0</td>
</tr>
</tbody>
</table>
Post 2

This post gives a personal report of someone at a meeting in which representatives of two government institutions (GGD and RIVM) gave a lecture and a woman opposed their story about a measles outbreak. Although the personal story could be considered to be positive from the anti-vaxx side the majority of emotional reactions still expressed a negative sentiment. This negative sentiment is targeted mostly at the fact that government institutions try to cover up seem the ‘real story’ and tried to convince people that it was a measles outbreak and that non-vaccination was the reason or this. People seem to be both angry and sad about this turn of events. Angry seems to be triggered by a 'how-dare-they' attitude towards these government institutions, while sadness seems to be coming from the realisation or the reaffirmation that covering up and lying seems to be normal for these institutions. Commenters also voice their concern about the regular media that seems to neglect their side of the story (“That’s why I do not the news!”). People also comment on the fact that vaccinated children seem to get ill as well and see it is a confirmation that vacation does not protect children.

“I know two children that got measles and those were both vaccinated...But sure just let the GGD put its head in the sand 😑”

“Ah Big PHARMA 😊😊😊”

“Hilarious, if it weren’t so sad!! GGD and RIVM are being reprimanded 😱!! Then just deny everything!! They aren’t better than a bunch of lying and scared toddlers!! “

In some comments anger is expressed either due to the choice of words, expletives (“fucking”) or by the use of emojis voicing their displeasure with how this situation was handle by these government institutions.

“All fucking lies anyway, so yes she is right [to call those representatives out]!”

“Terrible... 😞”

“It so horrible a misinformed GGD representative that spreads misinformation! 😡”

The negative sentiments are occasionally mixed with positive sentiment as people applaud the woman for standing up against the government institutions and tell the ‘true story’. Comments mention her bravery and see her as an inspiration. Commenters are disappointed that there is no recording of this session or at least not by people in this group.
“I think it SO bad that this is going deliberately being done! Fantastic that this woman opened her mouth to speak!”

“YESSS, well done!.. Exactly this !.... They retreat if they are confronted, because they are bullies and their information is incorrect, full of lies!... Confronting them with the truth is THE way!.. Compliments and a deep for this lady 🕒”

These comments clearly show the mixed emotion in the form of a negative sentiment towards the institutions, but positive sentiment towards the woman in question.

The non-emotional comments link to this disappointed as commenter discuss if regular media channels would pick this story up or discuss possible sources for either this event or similar occurrences.

The comment section below this post shows traces of conspiracy theories, mainly in comments mentioning Big Pharma, and show commenters distaste and distrust of the government institutions that are central in organising vaccination in the Netherlands. This distrust also extends to the regular media outlets. Although commenters showcase an interest in recordings of this event or similar stories that they can share they do not raise any question marks with the story. Comments show no signs of critical questions about if the retelling of this event is accurate (Was that woman really a supervisor in the childcare centre for example).

<table>
<thead>
<tr>
<th>Post Description: Personal story about a woman’s experience at a lecture given by the GGD (Health care provider on the municipality level) and the RIVM (Governmental research institute for health and environment).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post: Yesterday at a lecture by ‘buitense binnen’. “Questions about vaccination, protective or frightening?”? The GGD -RIVM were speaking. Well there we go..</td>
</tr>
<tr>
<td>It was about measles. According to the gentleman more and more children would die more measles that would NOT die if they would be vaccinated with the MMR because they now infected others. The outbreak would still be there. The man pointed out the last case in April of this year in The Hague. Something widely covered by the media. 3 children were infected with measles in a day care centre. The man explained that not all four children were not vaccinated. Two were too young and the other two would not have gotten their vaccines... Life-threatening according to him because they endangered others.</td>
</tr>
<tr>
<td>Then it happened...</td>
</tr>
<tr>
<td>A woman raised her hand and pointed out the man (GGD) had false information. The GGD objected that his story was correct. The woman kept insisting and explained she was one of the supervisors at this specific day care centre. At that</td>
</tr>
</tbody>
</table>
moment you saw the man of the GGD pale. The woman explained that it started with one child, then they informed the GGD. The child was examined and then number 2, 3 and 4 became sick. Conclusion: Measles.

But then…

The woman told that all of a sudden, the first child that started everything, turned out to HAVE received all vaccines. The GGD in the end concluded that it could not have been measles after all. And retreated. The woman of the day care centre was quite angry and felt left behind. Also because the media has never been honest about who and what.. De GGD could not remember this version of the story and could therefore not imagine it had happened this way.

I don’t know if I get this woman into trouble if I share this. I think she might be in this group already. Maybe she might react?

Date: 8th of November 2019

<table>
<thead>
<tr>
<th>Number of Reactions: 284</th>
<th>138 likes, 76 shocked, 58 love (heart), 9 laugh, 2 angry and 1 sad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of comments: 198 comments</td>
<td></td>
</tr>
<tr>
<td>Number of Emotional comments:</td>
<td></td>
</tr>
<tr>
<td>Total of Positive Comments</td>
<td>32</td>
</tr>
<tr>
<td>Total of Negative Comments</td>
<td>116</td>
</tr>
<tr>
<td>Fear</td>
<td>4</td>
</tr>
<tr>
<td>Anger</td>
<td>0</td>
</tr>
<tr>
<td>Mixed Emotion</td>
<td>7</td>
</tr>
<tr>
<td>Number of non-emotional comments:</td>
<td>28</td>
</tr>
<tr>
<td>Non-related Comments</td>
<td>15</td>
</tr>
</tbody>
</table>

Scientific Evidence

Post 1

The posts that generated most comments in this category do not concern vaccines, but other medicines or medical procedures (the two most popular posts deal with paracetamol and a vitamin supplement). Specifically, for this post was the dangers of taking paracetamol during pregnancy. The reactions to post are mostly positive as it shows more likes and joy (“haha”) emoji’s and no angry or sad reactions, but the analysis of the comment section seems to show that these positive reactions might be ironic.

Although the majority of the comments express either negative or positive sentiment there are still a lot of non-emotional comments. These comments are comprised of links to the Danish research on which the article was based, discussion about the possible harmful effects of paracetamol and the difference between aspirin and PCM. It seems like the commenters want to educate themselves about the possible dangers of medicines, not only vaccines. As one commenter states:
“There are people that think paracetamol is so innocent that they will use them on a daily basis. A little bit of “awareness” is kinda nice.”

These comments show on the one hand, a critical attitude that encompasses more than just vaccines and on the other hand, a willingness of these group members to educate themselves about these topics.

Most of the comments in this comment section express a negative sentiment though. The most prominent sentiment seems to be anger towards this ‘new’ development or a displeasure that PCM is determined to be dangerous, but vaccines are still considered safe.

“But vaccines are holy and safe...!”

“Okayyyy, so no paracetamol, no raw meat fish 😱but vaccinating pregnant women is just healthy and does not bring any risks....”

“Vaccination is not proven to be safe, but it is phrased that way. Under the motto of selling lies as the truth.”

These comments show a clear scepticism towards the research that is linked to. The sentiment seems to be that if ‘they’ (pharmaceutical companies, the government or researchers?) lie about vaccines then it is only logical to also mistrust this research. Some comments go as far as to suggest that this research is way to cover up side-effects of vaccines (e.g. autism) by pointing at other causes or a way to distract from the ‘real’ harm that vaccines cause.

“Are they trying to blame chronical illnesses on paracetamol instead of looking at the ingredients of vaccines what that does to the body?”

“Sounds like a distraction and causing noise. Paracetamol harmless and certain ingredients of vaccines harmful seems more plausible to me.”

Other comments were marked as expressing anger as they express a sentiment that goes beyond a doubting or sceptical outlook and were resorting to using swearwords or expletives in their comments. The sentiment remains the same though as these people seem to be angry about the results of this research (paracetamol can be dangerous for pregnant women) and seem to be frustrated about the question what pregnant women should do if they experience pain if they can not take PCM anymore.

“Bullshit! I don’t believe a thing!”

“What should I take then [if I experience pain]? Air?”
“Yet it’s all you can take.. But pretty much everyone had taken it so easy assumption. Like breathing air causes autism duh 😂”

“Such stupid comments that people make. We do nothing that is harmful but I am allow lots and lots of things that are not harmful, so it does not make any sense wat you are saying. But if you just wanna do whatever, because you cannot “anything” anymore be my guest 😣”

The comments show anger more in tone than in content. The choice of words shows exasperation and a sentiment of ‘i am done with this’. This led to the decision to classify these comments as anger, although no seed words were present.

<table>
<thead>
<tr>
<th>Post Description: Post consist only of an emoji expressing either wondering or doubt accompanied by a link to an article that speaks about the dangers of taking paracetamol during pregnancy.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post: 😐</td>
</tr>
<tr>
<td>Date: 6th of November 2019</td>
</tr>
<tr>
<td>Number of Reactions: 40</td>
</tr>
<tr>
<td>Number of comments: 181 comments</td>
</tr>
<tr>
<td>Number of Emotional comments:</td>
</tr>
<tr>
<td>Total of Positive Comments: 34</td>
</tr>
<tr>
<td>Total of Negative Comments: 84</td>
</tr>
<tr>
<td>Fear: 0</td>
</tr>
<tr>
<td>Anger: 15</td>
</tr>
<tr>
<td>Mixed Emotion: 8</td>
</tr>
<tr>
<td>Number of non-emotional comments: 47</td>
</tr>
<tr>
<td>Non-related comments: 8</td>
</tr>
</tbody>
</table>

Post 2

This post was categorised as in the category ‘scientific evidence’ as the poster points out ‘dangerous’ ingredients in a medicine. This method of using ingredients list as an argument that a medicine is dangerous is also used to argue that vaccines are harmful. The argumentation follows the line of thought that if the ingredients are dangerous, the medicine must be dangerous as well (usually leaving out the discussion about the amount of the substance that is used in the medicine). The comment section does, however, not reflect the emotional reactions to a scientific evidence post (outrage linked to conspiracy theories or being content that their children are not taking the medicine). Instead the comment section reflects more the answers expected to a medical advice post resulting in a majority of non-emotional posts. The commenters provide tips about alternative medicines, supply the poster with links to shops where the poster could buy these medicines and
having discussion on what E-numbers are harmful and in what way. They are also discussing an app that shows information about what E-numbers are harmful and in what products they appear.

The emotional comments that are present are mostly expressing a negative sentiment. These comments are either calling out the vitamin discussed by the poster for being “junk” or “poison” and seem disgusted (“Iewll” as an outcry of disgust) or bring in the conspiracy theory of Big Pharma and discuss how the industry wants to keep you sick to keep on making money off of you.

“[…] But indeed, it all only revolves around money; an American pharmaceutical company said recently that they are not there for the consumer, but for the stockholders; Well, I think that says enough, right…”

“Holy sh*t 🙁 Please don’t let him take that […]”

“I got a prescription for these as well but I already buy my own drops with no junk in it and then the pharmaceutical mafia can keep take their junk themselves.”

This comment section shows remarkable restrain from the commenters as they calmly discuss alternatives for the proposed medicine. It does seem to portrait a distrust in commonly used medicine as alternatives that are proposed are all homeopathic.

| Post Description: Post consist of a text and a photo with the leaflet outlining the ingredients of a vitamin D3. The poster is concerned with all the dangerous ‘E-numbers that are in this vitamin. |
| Post: This message does not relate to vaccines but is about vitamin D3 (for my dad). I read the accompanying leaflet and was shocked! Look at all those dangerous ‘red’ E-numbers.😊 |

| Date: 9th of November 2019 |
| Number of Reactions: 57 |
| Number of comments: 167 comments |
| Number of Emotional comments: |
| Total of Positive Comments |
| Total of Negative Comments |
| Fear |
| Anger |
| Mixed Emotion |
| Number of non-emotional comments: |
| Non-related comments |

| 33 shocked, 15 likes, 7 sad and 2 angry |
| 9 |
| 36 |
| 1 |
| 0 |
| 115 |
| 7 |
Government Conspiracy

Post 1

The post that gathered most traction in the category of Government Conspiracy is one that comments on a segment aired by a news programme in the Netherlands. The segment is about the new mandatory vaccination laws in Germany. This post is particularly interesting as the post has been changed due to the commenters pointing out that the original poster had not mentioned these changes in the law were made in Germany and not in the Netherlands.

“Would be nice if you add that this is about Germany DE?! There is a bit of a mixed signal like this and it is about how someone else interprets it.”

“Wait, do you mean in Germany or in the Netherlands?”

These comments show that the members of this group are not afraid to correct each other if they believe someone is giving false or misleading information. Another instance in this comment section also shows that they want proof or a source. In a comment chain about mandatory vaccination and the royal family, a commenter states that the children of the royal family get a different and ‘safer’ kind of vaccine. One commenter is sceptical and asks immediately about the source.

“The royal family gets special vaccination (if they get them) with less junk in them.

- “Do you have source? This is interesting.”

The fact that it was unclear at first that the post did not concern the Netherlands but Germany, commenters had some shocked reactions, some of them containing fear related seed words.

“This post scared me! But I read in the comments that it is about Germany. My cousin lives there but luckily the little girl is already 12 years old. Developed Alopecia after 14 months probably due to vaccines, so she has not been vaccinated after that.”

“I panicked for a second there”

“Definitely. It scared the hell out of me!”

“I hope you are right, but why do you think there will be no mandatory vaccinations for schools here? I actually worry about this”

These comments show seed words for fear like panicked, worry and scared and are therefore categorised as such. They do not, however, give a good insight into what scares these parents. Other comments do show this and reveal that the concern is twofold. On the one hand, it is the fear for the
vaccines and the health of their children if vaccination becomes mandatory. On the other hand, it is a growing worry over taking away the parent’s choice to vaccinate their children.

“In Italy is like this: if you pay, your children are not a danger. Obviously is a blackmail. They have scared the population in this way: don’t you have the money? Don’t you have alternatives? The solution is a vaccine!

Obviously it depends on the age of your children and if they have a compulsory education.

I just suggest to everybody to don’t let yourself be blackmailed: this has been the problem in Italy. If the population didn’t let the pharmafia win, now we were not oppressed.”

“Because they harm other with those injections. Imagine that a child’s body cannot break down all those additives!”

“Even if the whole country turns against me. So long as I am a mum I will determine if poison is injected”

Fear in these comments can also be related to conspiracy theories concerning ‘Big Pharma’ and overarching plans to push for vaccines as some comments do outline a more complicated conspiracy theory that involves schools and hospitals.

“Yes, this is all part of their plan. The only companies that go bankrupt at the moment are hospitals and schools. Accidentally, only curriculum from America is taught there. You do not get a study grant for alternative medicine and homeopathy, oh how I wonder how that happened...There is shortage of teachers and doctors and this will become worse. Children will have less opportunities to get an education and are being kept ignorant plus they will become ill through vaccination. At school they do not learn what people should know and a lot of information is being withheld. Hospitals will fail even harder people become sicker and weaker disaster ugh…”

Despite being worried a lot of comments do reflect a positive sentiment as commenters show themselves to be combative. Most state that if vaccination becomes mandatory they will gladly pay the fine to keep their children healthy (by not vaccinating them). Some comments just state that they hope that mandatory vaccination will never happen in the Netherlands, but others are more sceptical and predict it is only a matter of time.

Non-emotional posts reflect discussion over what these new laws entail and discussion over if it against the constitution to take away people’s freedom to choose whether to vaccinate or not. Commenters post links to both German and Dutch laws and to websites following the discussion in Germany. This shows again a willingness of these commenters to educate themselves on these
topics. Other comment discuss future scenarios in which vaccination also becomes mandatory in the Netherlands and possible solutions. Some commenters suggest to take to the street and protest, while others think about moving to another country or suggest more far-fetched ideas of starting a non-vaccinated community somewhere. Commenter also discuss sending up a fund to help anti-vaxx parents that do not have the financial means to pay the fine but do not want their child to be vaccinated.

<table>
<thead>
<tr>
<th>Post Description:</th>
<th>post about a news segment aired by ‘Het Jeugdjournaal” (news programme for children)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post:</td>
<td>Just on the children’s news... (Even kids are being indoctrinated about vaccination) Next year it will be mandatory for childcare centres and schools...otherwise a fine of 2000 euro (turns out to be Germany) Didn’t expect it to get this far</td>
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<tr>
<td>Date:</td>
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<tr>
<td>Total of Negative Comments</td>
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<tr>
<td>Fear</td>
<td>11</td>
</tr>
<tr>
<td>Anger</td>
<td>0</td>
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<tr>
<td>Mixed Emotion</td>
<td>6</td>
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<tr>
<td>Number of non-emotional comments:</td>
<td>97</td>
</tr>
<tr>
<td>Non-related Comments</td>
<td>15</td>
</tr>
</tbody>
</table>

Post 2

The comments expressing a negative sentiment express an outrage and disgust over instituting a system with buttons to show if someone is vaccinated. Although the article only mentions it as a suggestion for nurses, commenters see it as a slippery slope that can lead to buttons for all non-vaccinated people. This stigmatisation with a button reminds a lot of commenters of the David’s star that Jewish people had to wear during the Second World War. Most comments draw parallels between these two buttons with one commenter even commenting “Heil Hitler”. This sentiment is also shared through images either an original picture of a David’s star or a modified version that says ‘unvaccinated’

“David’s star or influenza injection button.......I see similarities. With a different point of view you have to be branded.......9”
Although a specific emotion is hard to pinpoint in a majority of these comments due to the lack of seed words, the driving emotions deduced from the context seem to be fear, anger and disgust. Some comments do express a clear anger both by their use of language and use of emojis

“Well, sorry, but this really harkens back to Hitler’s time. Classifying people and that leads to hate and discrimination. People know they don’t want to helped by certain nurses Bunch of insane madmen. Later also at schools, right. Really satanistic junk that goes way to far 😁😁😁 All fits within their plan and Bill Gates 😕”

“Uhhhh what the hell is this...Are we going back to nazi times...the whole of the Netherlands should rise up in protest but literally all the people!!! Regardless of background....cause this is just not normal 😥 we can’t life a humane life anymore like this...damn we should not except this people!!!”

The rest of the negative comments express a ‘what is the world coming to’ sentiment with people seemingly showing more concern than outright angry.

“Are you kidding me : |”

“It’s getting madder and madder 😁”

Non-emotional comments focus on questions concerning the Dutch Influenza foundation. Some commenters mention that they do not know that this foundation existed and ask for extra information that is then shared by others.

This post is interesting as the topic seem to spark a strong emotional reaction in commenter suggesting that the implication of these buttons seems important to the people in this group as the article seems to be enough to call for protests and draw parallels with Second World War imagery. This is especially noteworthy as this article only outlines a plan for nurses that are vaccinated to wear buttons and does not speak of any further plans to expand this to people who are not vaccinated. The immediate argument that this is only the first step to stigmatise non-vaxxers (slippery slope argument) shows that the emotional reaction is not to this particular plan but indicates a fear or anger to be stigmatised by others for their choice not to vaccinate.
Post Description: Post only consist of shocked/embarrassed emoji with a link to an article about an advice of the Dutch Influenza foundation that recommends health care professionals to wear badges if they have been vaccinated. This badge will give patients more feeling of security according to the foundation.

Post: 😂

Date: 10th of November 2019

Number of Reactions: 166
59 laughs, 57 shocked, 36 angry, 8 likes and 6 sad

Number of comments: 156 comments

Number of Emotional comments:

| Total of Positive Comments | 14 |
| Total of Negative Comments | 102 |
| Fear | 0 |
| Anger | 2 |

Mixed Emotion | 1 |

Number of non-emotional comments: 31

Non-related Comments | 8

Medical Advice

Post 1

Post concerns medical advice asked after receiving a street cat’s bite and scratch marks. The poster is worries about a possible tetanus shot and antibiotics that a doctor wants to prescribe, especially because she is 18 weeks pregnant and has Crohn’s disease. The post itself involves complicated medical issue and might therefore be seen as surprising as advice is asked to a group of individuals that is not medically trained (or at least with invisible credentials if people have them).

The vast majority of comments are non-emotional comments in which commenters advice the poster to try different kind of remedies (e.g. honey, silver sulphide, hydrogen peroxide, soda and doing nothing), provide links to web shops for these remedies or discuss how likely it is to get tetanus for a cat bite. Some provide personal stories as an argument (“I got bitten by cats a lot in the past and I am still alive with no tetanus”).

Some comments express a positive sentiment through encouragement (“Don’t worry, it will be alright” or “It is just a cat bite, it will heal by itself. Don’t worry!”)

This post shows the supportive nature of the group and the willingness to give medical advice without providing prove or sources to back up bold claims about a potentially harmful situation. It also showcases the belief in alternative medicine over more conventional medical practices as all the remedies are either home-remedies or homeopathic medication.
### Post Description:
The poster asks for medical advice concerning a street cat’s bite and scratch marks on her hand. She is worried about a possible tetanus shot and antibiotics as she has Crohn’s disease and is 18 weeks pregnant.

### Post:
I have just been bitten and scratch by a street cat and it really clinged to my hand. This is the deepest wound (swells and becomes blue between the knuckles) I have cleaned everything under a running tap and pinched it so everything could bleed out. Not every scratch bled. After that I soaked it in Dettol for 5 minutes. To be sure I have to go to the First aid clinic and they maybe want to give me a tetanus shot (I got my DKTP shot before I went to India in 2012 (before I didn’t know any better) and antibiotics. I never react well to antibiotics because I have Crohn’s disease. But I am 18 weeks pregnant and that worries me...Anyone has any tips?

### Date: 3rd of November 2019

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<th>Number of Reactions:</th>
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<td></td>
<td>8 Like, 4 joy, 2 shocked and 1 sad</td>
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<td>Number of comments:</td>
<td>191 comments</td>
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<tr>
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<tr>
<td>Fear</td>
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<tr>
<td>Number of non-emotional comments:</td>
<td>170</td>
</tr>
<tr>
<td>Non-related Comments</td>
<td>5</td>
</tr>
</tbody>
</table>

### Post 2

This post is about a parent that is concerned about taking her 4,5-month-old baby to the Philippines as she does not want her baby to receive the vaccines that are advised for this trip. The comment section mostly consists of non-emotional comments that discuss the up and downsides of taking a young child to a foreign country. Commenters rightly point out that there for example is not a vaccine against malaria for which the posters voiced her concern. Many commenters use their own experiences as an argument to either go or not go (e.g. “My daughter became sick when were in the Philippines [...]” or “I went to the Philippines with my nephews and I didn’t have any problems [...]”). Many commenters advice not to go, but do not give any argumentation.

The topic did spark a heated debate between commenters as one group argues that it is irresponsible of the parent to take a small child to far-away country (differences in climate and risk of different diseases). Some even argue that taken a small child on a plane can be harmful for its health. The other group argues that it is good for a child to experience other parts of the world. This argument is contradicted by the first group by saying that the child won’t remember anything anyway. The emotion in this discussion is mostly extrapolated from the use of exclamation points and question marks and the tone of the debate.
“For the millionth time: Do not go to a far-away country with a young child. Just let the child develop its immune system for what happens here. A young child simply does not ask to go to the Philippines. A young child just wants to play in the garden or on the floor, or by grandpa and grandma or by aunt Sjaan.”

- “A young child also benefits a lot from travelling!!”
  - “How??? I saw half the world as a child, I don’t remember a thing. A young child doesn’t benefit at all only except that it spends time with its parents”
    - “I find it curious that if a child cannot remember something it can also not enjoy the moment. Are you only doing things for someone if he can remember it. Doesn’t make any sense. Besides we MAY also enjoy ourselves as parents. The baby will also enjoy this. “

One commenter to another: “You reactions does not make any sense and is also short-sighted like I sense more from your reactions. You are all-knowing and know everything better than anyone your thing is the truth. Pity.”

Some commenters also question if the poster believes in non-vaccination as for them the advice seem to be self-evident: If you believe vaccines do not work, you will also not consider them if you go abroad.

This post shows an expected majority of non-emotional responses with commenters discussing up- and downsides and providing advice to the poster. Although some outside sources are posted, most arguments are only supported by either personal experiences or nothing. The heated discussion about taking young children to a foreign country is interesting as it shows that the group is not afraid to question and be critical towards its own members.
Post Description: The poster asks for medical advice concerning vaccination her child when she goes on holiday to the Philippines.

Post: Hi all,

I definitely do (did) not want to vaccinate my little one. But the situation now is: We are going on a holiday to the Philippines in February with a baby of 4,5 months old. I am scared that is too big of a risk to not do it because of malaria etc. but on the other side am I to scared to do it 😞

What is your advice? Anyone been to the Philippines with a small child? My son is still breastfed.

Date: 17th of November 2019

Number of Reactions: 6
4 Like and 2 shocked

Number of comments: 190 comments

Number of Emotional comments:

Total of Positive Comments | 18
Total of Negative Comments | 46

Fear | 0
Anger | 0

Mixed Emotion | 1

Number of non-emotional comments: 119
Non-related Comments | 6

Emotional/Non-emotional and Negative/Positive sentiment

Observing the total of emotional comments for all of the post there seems to be not a large difference between non-emotional (625 – 41.9%) and emotional comments (868 – 58.1%). Post followed expectations with posts in the GC and PS category accounting for most emotional comments, while the other two categories accounted for most non-emotional comments.

Although the analysis also did not show a large gap between comments expressing a positive sentiment (331 – 37%) versus comments expressing a negative sentiment (537 - 59.9%) with only a small amount expressing a mix between positive and negative (28 – 3.1%), most comments expressing a positive sentiment only came from most popular Personal Story post (166 of 331).
Concerning my first research question the pre-analysis showed no significant difference in the amount of posts falling into the more emotional categories (PS, GC) with the other categories. The least amount of posts was classified as personal stories (PS) giving the impression that emotional content might not be as present as expected. The main analysis follows this trend by showing that comments expressing an emotional sentiment do outweigh the non-emotional comments, but not be a large margin. This seems to contradict the notion established by other studies (Lutkenhaus, 2019; Betsch et al, 2012) that most of the communication in the anti-vaxx movement consist of emotional and personal content. The Dutch anti-vaxx movement seem to approve of a more ‘scientific’ and rational discussion within the closed-off Facebook group than outside of it. This could be because people within the group feel like they do not have to defend themselves as much because the group consist of like-minded people. The emotional sentiments also followed the expectations for the different categories established in the preliminary analysis with personal stories (PS) and government conspiracy (GC) eliciting more emotional responses, while the other two categories (SE and MA) gathered more non-emotional comments. Clearly, the latter categories prompt commenters to provide fellow members with advice more than trigger them to react emotionally. The hypothesis that flowed from Lutkenhaus et al. (2019) that negative sentiment would be more prevalent also seems to fit. There was a notable exception as one of the posts in the personal story category clearly expressed a positive sentiment. This positive sentiment led to more comments that expressed a positive sentiment as well, because a lot of commenters agreed with the original post. Interestingly, this would contrast the statement by Lavine et al. (1999) that negatively framed messages would spark stronger reactions. As this research concerns authoritarians, finding a strong reaction to a positively framed message might be an indication anti-vaxx movement and other conservative groups might differ in make-up, although in both conspiracy thinking is rampant. Although, it was surprising that his post generated the most comments within the studied timeframe, the other posts still show that comments expressing a negative sentiment are more prevalent than positive ones.

Interestingly, the posts that gather the most traction within the set timeframe were not necessarily representative for the other posts within the same category when looking at the results of the preliminary analysis, especially for the SE and PS category. For the SE category, one post was classified as SE, while the comment section for this post reflected more a comment section of an MA post with people providing the poster with medical advice rather than criticising conventional medicine as expected. Both SE posts were also not related to vaccines but were instead about other medication.
Furthermore, the personal story that gathered the most comments within this timeframe expressed a positive sentiment, while most personal stories in the preliminary analysis showed a negative sentiment (concerning personal stories/experiences about negative effects of vaccines).

The posts not following the same pattern as the majority might be an indication of what the commenters in this group are most passionate about as these posts did gather the most interest within the timeframe. It, however, might also be an indication that these posts were more unique and therefore gathered more traction; as posts with a negative sentiment are more numerous, comments are less concentrated and more dispersed over a larger number of posts, thus gather less comments individually.

Patterns and context

Analysing multiple comment sections also revealed some patterns in how commenters react to both the post and to each other. The first noteworthy pattern is that there is a willingness in this group to provide others with information and support each other (thanking each other, wishing each other good health). Comments show that these closed-off Facebook groups are not only a source of information, but also a supportive system. Hand-in-hand with this willingness to share information is an eagerness to be well-informed and adopt a critical attitude, at least to a certain extend. Commenters are quick to call out others to provide sources. Interestingly, however, they usually do not scrutinise the source except if the source is one of the traditional media outlets. This follows the theories outlined previous research that people are more sceptical towards mainstream media and put more faith in alternative sources.

If a claim is not backed up by a source, a personal story is usually brought up as an argument to prove the ineffectiveness of vaccination, show the harmful effects on children or to show the other side of the coin that non-vaccination are perfectly healthy. This is also in line with the previous mentioned theories (Betsch et al, 2011; Lutkenhaus, 2019; Kata, 2012)

Furthermore, the comment sections also followed the theories about pre-existing beliefs as in the comment section both the belief in conspiracy theories (‘Big Pharma’) and the belief in alternative medicine over conventional medicine were clearly visible (Ernst, 2001; Nasir; 2000; Kata, 2012). This also seems to confirm the results of previous research distinguishing different groups within the anti-vaxx movement (ECOM, 2015; Lutkenhaus et al, 2019).
Emotional sentiment in the Anti-Vaxx Movement

Where the categorisation of comments into negative and positive sentiment gave a clear outcome, the detection of emotions through the seed word method only provided sporadic results. Comments did show hints of fear and anger but often showed mixed emotions with no clear seed words for either fear or anger, making it unclear which emotion is the main motivational driver and therefore not confirming Betsch et al. (2013) results on fear being the main driver. The assumption that posts concerning government conspiracies (GC) would have generated more comments expressing anger was not confirmed. As the analysis does show that a negative sentiment is much more present than a positive sentiment, it is likely that if there is a main emotional driver underlying vaccine hesitancy it would be a negative emotion. Comments expressing a negative sentiment show a mix of negative emotions like disgust, fear and anger depending on the post. Also, common seem to be a sentiment that expresses a sort of helplessness or despair (“What is the world coming to”). A case can therefore be made to expand research to encompass not only fear like Betsch and her colleagues did, but also other negative emotions.

Furthermore, if a fear is the main emotional driver, it might also be dampened by the ‘dilution of threat’ that was discussed in previous research. Comments show signs of this phenomenon as they make fun of diseases like the measles or play down the impact of diseases as commenters for example argue that their grandparents also got the measles when they were younger and are just fine now or speak about ‘natural immunisation’, meaning children being infected on purpose to build immunity.

Although it was not possible to pinpoint the main driving emotion that leads people within this group to refuse vaccination or at least be hesitant towards vaccination, negative emotions seem to more prevalent than positive ones. Based on the results research should be expanded to not only include fear as driving factor but also look into other negative emotions that might play a role in the decision-making process of refusing vaccination.

Limitations

Using the comment section of the closed-off Facebook group did come with some limitations. Without admin privileges or the opportunity to ask the admin of the group for information I could not get a complete overview of all the posts within the group. This limited my ability to classify posts accurately or to estimate the amount of posts that needed to be analysed to get a representative sample. This overview would also have helped to have a better justification for the timeframe and would have made it easier to analyse the data. Furthermore, a larger sample than only one month...
would give a more complete view of the sentiment that is present within communication in this group.

Furthermore, this study could have been improved by using multiple coders to classify the Facebook posts and analyse the individual comments. Establishing inter-coder reliability improves the quality of the research as it reduces the subjective nature of the coding process (Mayring, 2004). The seed word analysis would also have been more effective if a comprehensive list of emotional seed words would have been available in Dutch.

**Conclusion**

Anti-scientific sentiment and the rejection of the scientific method seems to be on the rise through different avenues in society. Although vaccination has been regarded with scepticism and hesitancy since the first vaccines were introduced, the development of the internet into an interactive platform on which people can create their own information in combination with other societal factors have made the anti-vaxx movement both more vocal and effective. Traditionally the method to combat vaccine hesitancy was to provide to simply provide more information, but slowly realisation has dawned that more research is needed into what motivates people in this movement as mere provision of information seems insufficient. Previous research shows that multiple factors might be interfering with just making a decision based on scientific information including mental heuristics and conspiracy thinking. Recent research by Betsch and colleagues even explored fear as an underlying emotional driver that motivates people within this movement.

This study tried to add to the existing research by exploring if previous patterns and motivations that were identified were also present within the closed-off Facebook group of the anti-vaxx movement in the Netherlands, thereby adding a new type of data that takes the interactive nature of the Web 2.0 into consideration. Reflecting on research on conservative movements that show similarities with the anti-vaxx movement, this study wanted to explore if more negative emotions should be taken into consideration as emotional driver and identified anger as an emotion of particular interest.

The results of this study suggest that people in this closed-off Facebook group are less prone at expressing or using emotional content, but instead also engage each other in more fact-based debates, although the validity of the facts can still be drawn into question. The comments made in this group do show similar patterns as identified by previous research with comments concerning conspiracy theories and alternative medicine being made often. Furthermore, an analysis of underlying emotional sentiment showed that a negative sentiment is more often expressed than a
positive one. Seed word analysis showed no indication of either fear or anger being the main emotional driver, but the negative sentiment and research on other movements indicates that further research should not only look into fear as underlying emotion in this movement but also take other emotions into consideration.

Furthermore, this study supports the idea that although the traditional method of providing accurate scientific data proving the usefulness and importance of vaccination programmes should not be abandoned, a better understanding of underlying emotional and cognitive factors can be helpful to phrase this information and decide through which channels the information can be delivered to have the most impact.

Acknowledgment

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Bibliography


