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# **THE ROLE OF SOCIAL MEDIA IN ATTITUDES TOWARDS VACCINATIONS**

**Social media as a tool in vaccination movements**



## ABSTRACT

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The progress made in battling vaccine-preventable diseases is in jeopardy due to increasing vaccine hesitancy. Global coverage has started to decrease and some of the vaccine-preventable diseases are resurging to our communities. There are many reasons for vaccine hesitancy, concerns about the safety of vaccines, lack of knowledge, religious or cultural reasons, perceived importance of vaccinations and inclination to freedom of choice. While concerns about vaccine safety seem reasonable, as a result, anti-vaccination movements have taken a strong foothold especially in social media, where providing information and experiences is fast and effective. The balance between misinformation provided and information is slanted, and while misinformation is readily available, information is hard to find and difficult to understand, which makes informed decisions impossible to make.

This study was done as a systematic literature review with a scoping review method. The aim was to produce information about the social media as a tool for pro-vaccination information by recognising how is social media used for providing anti-vaccine information. Aim was also to understand characteristics of anti-vaccine groups and of the groups vulnerable to misinformation.

Vaccine hesitancy is a grey area when it comes to human rights. Who has a right to decide on childhood vaccinations and protection of children? Is it every parents job to consider the safety of communities through herd immunity? What are the rights and duties of health care professionals? Can we silence the misinformation of anti-vaccination groups or are we violating freedom of speech? This study was done as a systematic literature review and it aimed to find scientific studies that could answer these questions and provide information on the possible ways to solve the vaccinating conflicts.

Conflict resolution methods in vaccine hesitancy have been studied and found effective. More activity from health care professionals is needed in order to increase vaccine knowledge and decrease the hesitancy and concerns. Social media can be one of the efficient ways to reach the audience. This thesis provides information necessary to increase pro-vaccination initiatives.

Keywords: vaccine hesitancy, anti-vaccine, pro-vaccine, social media

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## 1 INTRODUCTION

Vaccine hesitancy is threatening to reverse all the progress made in tackling vaccine-preventable diseases. However, vaccination is the most cost-effective way to avoid vaccine preventable diseases, currently preventing 2-3 million deaths a year, and with a better global vaccination coverage, a further 1.5 million deaths could be avoided. Vaccinations have been recognised as one of the most successful measures of public health, yet they are increasingly being perceived as unnecessary and even unsafe. Lack of confidence in vaccines has become a threat not only to vaccination programs but to public health. Vaccine coverage is decreasing, and outbreaks of vaccine-preventable diseases are increasing all over the world. Vaccine-hesitancy and anti-vaccination movements are believed to be responsible for this. (Dube, Loberge, Guay, Bradamat, Roy & Bettinger. 2013; WHO. 2019.)

Anti-vaccination movements have a long history starting from 1763 when French parliament banned vaccinations in Paris, through anti-vaccinations leagues to celebrity non-vaxxers. Over the last two decades, growing numbers of parents in the industrialized world are choosing not to have their children vaccinated. The role of health care workers has been emphasized as troops educating patients on about vaccinations. The fight is between scientific reviews supporting safety of vaccinations and groups that refuse vaccinations for various reasons, such as religious, political, legal or philosophical reasons, personal beliefs, safety concerns, and experienced lack of information from healthcare providers. (McKee & Bohannon. 2016.)

The results of anti-vaccination attitudes can already be seen. The contemplation on (MMR) vaccine and development of autism in young children in media in 1998, caused parents to shy away from MMR, and as a possible result measles cases have gone up from 63 (2010) to 1276 (2019). Though several studies published later, disproved the association between the MMR vaccine and autism, the harm had been done and the vaccination rate dropped from 92% to 61%. (Hussain. Ali. Ahmed & Hussain. 2018). Since vaccination coverage (the estimated percentage of people who have received specific vaccines) also known as "herd immunity" is what protects people from existing diseases and helps eradicate diseases all together, a drop this big in vaccination percentages is significant.

Why are anti-vaccination movements convincing people against vaccinations? Why does anti-vaccination information reach people better than information from health care providers and why is it valued higher than scientific information? One answer could be social media. Parents deciding against vaccinating their children rarely reach these decisions on their own. They are influenced by their social networks, as sources for information, direction, and advice on vaccinations. These social networks can be physical, but this thesis concentrates on the most effective social network ever, social media. (Brunson. 2013.)

## 2 VACCINES AND VACCINE HESITANCY

Immunity is the body's way of preventing disease. Babies are born with some passive immunity from the antibodies that they receive from their mothers. That immunity will wear off and be boosted by a vaccine. When our bodies are infected with a special antigen for the first time, the immune system produces antibodies to fight the antigen. It takes time for the body to "find the right weapons", which means that the antigen wins the battle and the person gets sick. This can be prevented by giving the antigen to the body and hence the immune system, in an inactivated, live attenuated or killed form in a vaccine, to stimulate the body's own immune system. These vaccines are not strong enough to cause the disease, but they are strong enough to make the immune system produce antibodies that lead to immunity. (CDC.2019; WHO. 2018.)

Immunization is a proven tool to control and eliminate life-threatening infectious diseases. It is not only the most cost-effective health investments, but also can be easily made accessible to vulnerable populations as well as delivered effectively. Immunization protects directly the immunized person and indirectly communities by decreasing the spreading of pathogens. When the vaccination coverage, the estimated percentage of people who have received specific vaccines, is high, even people who cannot be vaccinated can be protected. Also, if a person in the community gets sick, there is less chance of an outbreak because it's harder for the disease to spread. When the reason for vaccination refusal is based on medical standard practice, the vaccination coverage remains strong. When vaccination hesitancy increases and vaccines are refused for other reasons, the amount of refusing people increases to levels that harms vaccination coverage. (THL. 2020; WHO. 2018.)

### 2.1 Vaccine hesitancy

Vaccine hesitancy as a term has emerged in order to separate the anti-vaccine ideology from the pro-vaccine ideology. WHO characterized vaccine hesitancy as "a behavior, influenced by a number of factors including issues of confidence (do not trust a vaccine or a provider), complacency (do not perceive a need for a vaccine or do not value the vaccine), and convenience (access)" (WHO.2013). Vaccine hesitancy was considered one of the ten biggest threats to global health by WHO 2019.

Since most of the vaccinations are received in childhood, when talking about vaccine hesitancy, the discussion is usually about parents who have concerns about their children's' vaccinations. Vaccine hesitant groups have varying reasons for indecision about vaccinations in general or about specific vaccinations. Vaccine hesitancy does not necessarily mean not accepting the vaccinations at all, but may also mean concerns about vaccinations in general, about a specific vaccination or about vaccinations schedules. The "anti-vaxxers" who completely refuse vaccinations is estimated to be 3% of parents. This small group is found to be fixed in their beliefs and not adopting the information from health professionals, unlike most vaccine hesitant parents who respond and react to information provided. (ECDC. 2015; Edwards & Hackell. 2016.)

Though the health care providers are considered to be the most trusted source of vaccine-related information, they have been found to be increasingly vaccine hesitant themselves. Though the health care providers vaccine hesitancy has been mostly studied related to seasonal influenza vaccines, it has been found that more attention needs to be paid to different levels of vaccine hesitancy among healthcare workers and how their hesitancy could influence patients. (ECDC. 2015.)

## 2.2 Potential causes of vaccine hesitancy

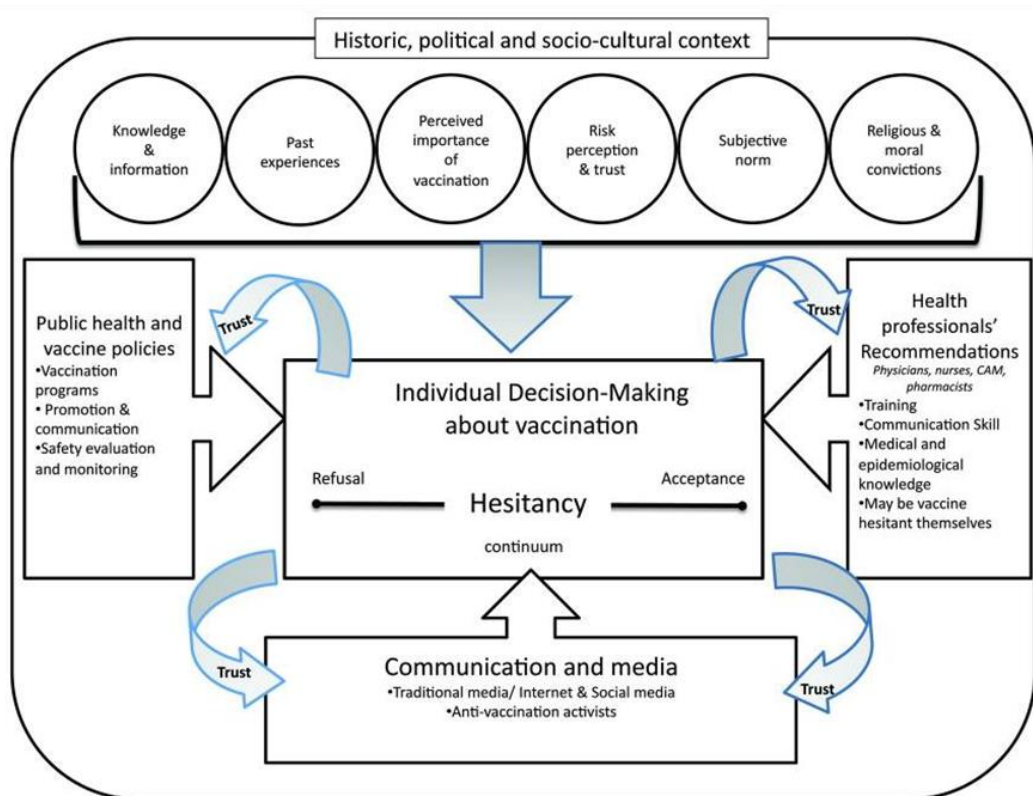
Decision making regarding vaccinations should be seen as a wider socio-cultural context, where several factors can influence the decision making. These factors can be experiences with health care providers, family history, attitudes of friends, limited knowledge, alternative belief models, misunderstandings, feelings of control or losing control and social media. Lifestyle concentrating on health promotion and involvement in decisions about own health is becoming popular. Informed patients want to be part of the health-related decision making, sharing the responsibility with health care professionals. This can be considered positive development. (Dube et al. 2013; Pugliese-Garcia, Heyerdahl, Mwamba, Nkwemu, Chilengi, Demolis, Guillermet & Sharma. 2018, Williamson & Gaab. 2018.)

Another reason for vaccine hesitancy may be the controversies about vaccinations and vaccinations scares the public has had in past years such as relation between hepatitis B vaccine and multiple sclerosis or MMR vaccine and autism. Though in many cases no evidence has been found to support these controversies, the questions have been raised in

peoples' minds. (Dube et al. 2013; Edwards & Hackell. 2016; Vasconcellos-Silva, Castiel & Griep. 2015; WHO 2013.)

Figure 1 explains in larger context a model of vaccine hesitancy. As the figure shows, pro-vaccination attitudes require a lot of trust, that at times may go against socio-cultural factors meaningful to the person. The vaccine policies and recommendations from health care professionals play a similar role in affecting the vaccine related decision making than communication with non-health care professionals in social media and other social contexts.

Picture 1. Conceptual model of Vaccine Hesitancy (Dube et al. 2013)





### 2.3 Human rights perspective to vaccinations

The Charter of Fundamental Rights of the European Union states that: ‘Free and informed consent must be respected in the fields of medicine and biology.’ However, in Europe, eleven countries consider childhood vaccinations mandatory. Out of these Latvia and Italy have ten mandatory childhood vaccinations, while Bulgaria, Croatia, Czech Republic, France, Hungary, Poland and Slovakia have nine vaccines mandatory for children and the rest of the countries recommend them. The requirement is supported by fines up to €2500 and kindergarten and school bans for unvaccinated children. (Bozzola, Spina, Russo, Bozzola, Corsello, & Villani. 2018; Charter of Fundamental Rights of the European Union. 2000.)

The mandatory vaccinations can be based on children’s rights, also stated in The Charter of Fundamental Rights of the European Union (2000): “Children shall have the right to such protection and care as is necessary for their well-being” and “In all actions relating to children, whether taken by public authorities or private institutions, the child’s best interests must be a primary consideration.”. United Nations Sustainable Development Goal no 3 aims to “ensure healthy lives and promote well-being for all at all ages”, pointing out the benefits of vaccinating children regarding eradication of certain diseases. United Nations Human Rights article 3 “Everyone has the right to life, liberty and the security of person” can be seen to support the life and security of the children but also as a liberty to choose of the parents. (United Nations. 1948; United Nations. 2019.)

When regarding human rights, the rights of the parents (liberty to choose) goes against the rights of the children (right to be protected). Since vaccinations do protect the health of a child, but also health of the public, laws have been established to protect the public health. U.S. Supreme court has ruled that parents do not have a constitutional right not to vaccinate their children. The law protects the general public health and does not consider the different reasons behind vaccine hesitancy. Some U.S. states consider failure to provide vaccinations as “medical neglect”, especially if the vaccination is needed to protect the child from serious physical harm. (Parasidis & Opel. 2017.)

Human Right laws do protect the freedom of speech. Both, The Charter of Fundamental Rights of the European Union (2000) and Universal Declaration of Human Rights by United Nations (1948) state that: “Everyone has the right to freedom of expression. This

right shall include freedom to hold opinions and to receive and impart information and ideas without interference by public authority and regardless of frontiers.” This raises a question of social media and its effect on vaccination hesitancy.

#### 2.4 The role of social media

Even in the face of evidence of the safety and effectiveness of vaccines, the controversy and the vaccine scares stay alive in media. The influence of media controversies on vaccine uptake has been noticed in several scientific studies. Internet and social media take this effect a step further. Social media offers a fast and effective opportunity for anti-vaxxers to spread their message. The internet, including social media, has become an essential source of information and sharing experiences, and though health care professionals are still often consulted about health concerns, social media offers a new dimension to health information. (Dube et al. 2013; Smith. 2017; Vasconcellos-Silva et al. 2015.)

Social media groups are echo-chambers where users only hear and see whatever supports their own beliefs and clusters of opposing views rarely interact. This can be alarming considering that according to studies, the information available through social media is of variable quality and predominantly inexact or negative of content. Anti-vaccination websites have also been shown to share common characteristics and similar arguments and strategies to disseminate their message. Arguments against vaccination safety and usefulness are common, using statements from presence of poisons in vaccines to use of personal stories of vaccine damage. (Dube et al. 2013; Smith. 2017; Vasconcellos-Silva et al. 2015.)

The studies continue to suggest also that many of the arguments used by anti-vaccination activists can be seen as “the employment of rhetorical arguments to give the appearance of legitimate debate where there is none, an approach that has the ultimate goal of rejecting a proposition on which a scientific consensus exists” also known as denialism. Typical tactics of denialism are relying to conspiracy theories, selecting only evidence supporting their cause and rejecting other evidence, using fake experts, centering around oppression by institutional government and creating impossible expectations of what research can deliver. Other arguments include safety of the child (natural immunity is better, or the child’s immune system is not ready for the vaccines) and ineptitude of vaccines to protect

from non-vaccine preventable diseases. (Dube et al. 2013; Smith. 2017; Vasconcellos-Silva et al. 2015.)

Controlling anti-vaccine propaganda in internet and social media sites would threaten freedom of speech. However, sites like Facebook are diminishing the reach of anti-vaccine information in ads or recommendations, but they cannot stop the anti-vaxxer groups from posting information. Pinterest combats health misinformation by providing information to vaccine related searches from major public health organizations, including the World Health Organization (WHO), Center for Disease Control (CDC), American Academy of Pediatrics (AAP) and Vaccine Safety Net. Instagram will no longer show or recommend any content with vaccine misinformation and YouTube has removed adverts from channels that promote anti-vax content. (Ortutay. 2019; Tate. 2019; Wong. 2019.)

Social media, while effective tool for anti-vaccine activists, can also provide an effective platform for understanding vaccine hesitancy and refusal as well as a tool for spreading pro-vaccine information. Since social media has partly replaced the doctor-patient interaction, participation by experts and health officials in social media discussions and even establishing social media communities of experts, is critical to balance the information available and correct misinformation. (Orr et al. 2016.)

### 3 DESCRIPTION OF THE STUDY PROCESS

This thesis was done as a scoping review. Scoping reviews are used to clarify working definitions and conceptual boundaries of the field. Scoping review is particularly useful study method, when the literature related to the study has not yet been comprehensively reviewed and when the literature available is too complex for systematic review. Scoping review aims to examine the extent, range and nature of research activity, summarize research findings, identify research gaps and make recommendations for future research. (Daudt, Van Mossel & Scott. 2013; Levac, Colquhoun and O'Brien. 2010; Peters, Godfrey, Khalil, McInerney, Parker & Soares. 2015.)

With a pre-exploration of the subject it became clear that scientific studies on the subject are limited in the amount and broad in scope of the study. This supported the choice of scoping review as study method for this thesis. The thesis follows Arksey and O'Malley framework (2005) for scoping review. Arksey and O'Malley framework maps rapidly the key concepts, main sources of information and types of evidence available on the research area and is very usable in areas that have not been reviewed comprehensively before. (Daudt et al. 2013.) Arksey and O'Malley framework includes six stages. This are identifying the research question, identifying relevant studies, study selection, charting the data, collating, summarizing and reporting the results and an optional consultation exercise. Arksey and O'Malley's framework is considered to offer the best framework for a scoping study to date. (Daudt et al. 2013.)

#### 3.1 Analysing the data

Original studies and articles on original studies in scientific publications were approved for the thesis. The source of the publication and the study methods were reviewed carefully and studies were approved for the thesis based on these characteristics. Many of the studies seemed to be done in US context. This was not a deliberate choice of the researcher. The reason for the large amount of US based studies could be explained by the location of the researcher or activity of vaccination related studies in different countries.

Large amount of material related to attitudes towards vaccinations, usage of certain vaccination and other vaccine hesitancy material without social media connections was

found, but rejected. The aim was to find studies related to human behavior in social media, which was successful with these searchwords.

After reading through the accepted studies, certain concurrent main themes could be identified. These themes were misinformation, the features of AV and PV groups, the use of social media in vaccine related information and the features of audience in AV and PV groups. The studies were again reviewed and grouped by these recognised themes and the themes were defined and named to match the contents of the studies. The themes were then interpreted and reported by the importance and validity of the information. Notable is that the features of the audience differed in the studies, though similar features were also recognised.

Picture 2. Thematic analysis



### 3.2 Identifying the research questions

Anti-vaccination movements are believed to be the cause of the return of certain diseases. This thesis aims find the ways to provide targeted information that might change attitudes towards vaccinations without arguing people's freedom of choice. Hence aiming to protect the groups that despite of being PV are now in higher risk, due to net coverage suffering from AV movements.

The subject is relevant for these master's degree studies, since understanding the anti-vaccination movements and the factors affecting them help us develop communities that are well informed and possibly promote PV attitudes in communities. Even though the thesis does not aim to change the attitudes; it aims to find the reasons behind both movements in order to provide tools for further community development.

Several studies have been made on conflict resolution models useful in solving vaccine hesitancy conflicts. Williamson & Gaab (2018) suggest an interdependent system, that could be reached by increasing the relational content of vaccination consultations, as well as increasing audience deliberation on tensions and hesitancy. E

dward & Hackell (2016) lean towards compromising and accommodating methods, by flexibility in vaccination schedules and personalized messages on vaccine safety. Dismissing the hesitant and resistant parents to save time for those who are more likely to be convinced, was a factor that required further discussion when it comes to conflict resolution. Healy (2014) and Jarrett, Wilson, O'Leary, Eckerberger & Larson (2015) also stressed the role of health care providers in conflict resolution in vaccine hesitancy. They found that educational tools and provider-parent interaction appeared to be an efficient conflict resolution measure.

The subject also deals closely with human rights in several ways. Everyone has a right to refuse vaccinations but is it a violation of human rights when the decision is made for a child without their own consent. Are human rights also violated when AV movements decrease the net protection of the people who have chosen to be vaccinated. These are complicated human rights issues that are not easily solved, but the thesis aims to bring out different aspects of human rights issues in these cases as well as freedom of speech considering social media. Research questions are not directly linked to human rights since

vaccine hesitancy as a human rights issue is a complicated and complex matter, that has no clear answers. (Charter of Fundamental Rights of the European Union. 2000; (United Nations. 1948; United Nations. 2019.)

In this thesis, I have the following three research questions:

1. How is social media used in spreading anti-vaccination information?
2. How can the groups searching vaccine related information in social media be identified by gender, education, family size, background, etc.?
3. How can social media balance the amount of pro- and anti-vaccination information?



## 4 MATERIALS AND METHODS

Vaccine hesitancy and anti-vaccination movements have been a topic of increasing interest in the last few years, and many scientific studies have been made regarding the effect in public health as well as reasons behind the movements. The role of social media has also been a matter of interest, though fewer studies can be found on the subject. The data gathering for background was done as a systematic literature review in December 2019. Four databases were used and the search words and hits are described in the chart below. Search words were pretested in the databases, and the words used in the search were Anti-vaccination AND social media, Vaccine hesitancy AND social media. Advanced search was used to choose full text articles, peer review articles and not over five years old researches.

### 4.1 Data collection

The search word "anti-vaccination" was found more sufficient in producing hits than the tested "anti-vaccinators", "anti-vaxxers" and "anti-vaccine movement". Another search word "vaccine hesitancy" was added, though it covers a larger field than actual anti-vaccination idea. In researches these too terms are often used as synonyms. These searchers produced a sufficient amount of hits and no need for other search words was found.

In the following table, the data research process is explained in detail. Google Scholar search produced 11 hits, out of which 10 were relevant and one was irrelevant. Cochrane search produced 12 hits, out of which one was relevant, eight were irrelevant and two were previously found. "Vaccination AND social media" was discarded as search term as this point, since "anti-vaccination AND social media" seemed to respond to needs better. PubMed search produced 46 hits, out of which 10 were relevant, 32 were irrelevant, and four had been previously found. Sage journals produced seven hits, out of which three were relevant and 4 irrelevant. In round two of study selection 42 hits were left out, because most of them emphasized other vaccine related matter than social media, some were articles only and one was only available in Spanish. Finna produced 29 hits, 2 relevant, 23 irrelevant and 4 previously found. JBI ovid did not produce any hits. Four more studies were later discarded, since the full text was not available for use. Search process is pictured in Table 1 and Acceptance process in Chart 1.

Database/limitations	Search terms	Hits	Chosen
<b>Cochrane</b>	<b>Anti-vaccination AND social media</b>	1	1 irrelevant
	<b>Vaccination AND social media</b>	5	5 irrelevant
	<b>Vaccine hesitancy AND social media</b>	6	2 relevant 2 irrelevant 2 previously found
<b>Finna</b>  Free full text 2014 – 2019	<b>Anti-vaccination AND social media</b>	19	1 relevant 16 irrelevant 2 previously found
	<b>Vaccine hesitancy AND social media</b>	10	1 relevant 7 irrelevant 2 previously found
<b>Google Scholar</b>  Search words in the title of the article 2015 - 2019	<b>Anti-vaccination AND social media</b>	9	9 relevant
	<b>Vaccine hesitancy AND social media</b>	2	1 relevant 1 irrelevant
<b>JBI OVID</b>  Free full text 2014 – 2019	<b>Anti-vaccination AND social media</b>	0	0 relevant
	<b>Vaccine hesitancy AND social media</b>	0	0 relevant
<b>PubMed</b>  Free full text 5 years	<b>Anti-vaccination AND social media</b>	27	7 relevant 19 irrelevant 1 previously found
	<b>Vaccine hesitancy AND social media</b>	19	3 relevant 13 irrelevant 3 previously found
<b>Sage Journals</b>  Full text 2014 - 2019	<b>Anti-vaccination AND social media</b>	2	2 relevant
	<b>Vaccine hesitancy AND social media</b>	5	1 relevant 4 irrelevant

Table 1. Data research

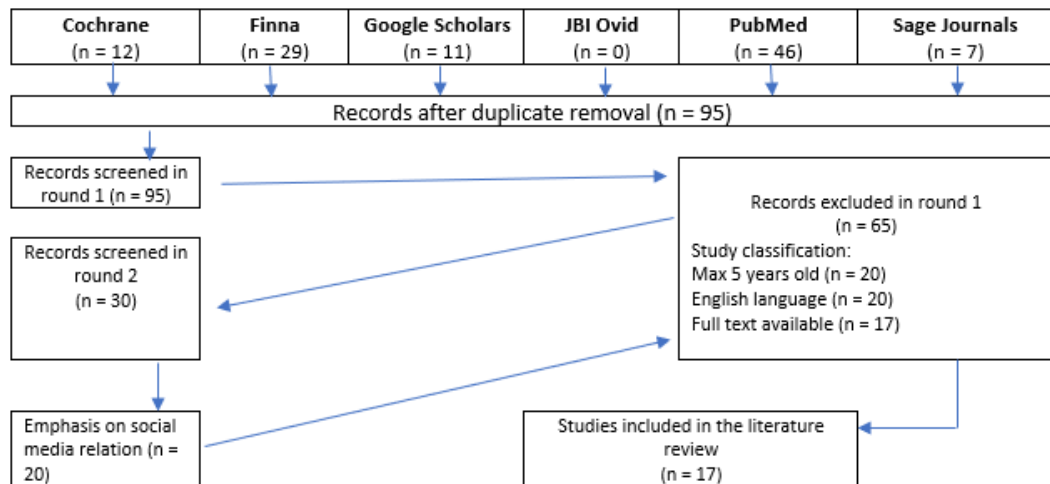


Chart 1. Study acceptance process

After the duplicate studies were removed, records were screened for relevancy, age and language. Records that did not have full text available were removed at this point. Finally, records were screened for emphasis on social media and 17 studies were included in the final literature review. "Social media" was accepted in several forms, Facebook, Twitter, Instagram and YouTube related studies were included, while web pages generated by private citizens were excluded. Private web pages were considered less visible to public. Celebrity web pages, that would have been more visible to public, were not a subject in any of the records found.

#### 4.2 Charting the data

In the following table the data is introduced in alphabetical order by the author. The study methods and main results are explained in short in this chart. Results are explained in further detail in the next chapter.

Study	Published	Method	Results
<p>Chiou L. &amp; Tucker C. 2018</p> <p>Fake news and advertising on social media: A study of the anti-vaccination movement</p>	<p>National Bureau of Economic Research</p>	<p>Exploring the role of Facebook groups in spreading false information on vaccinations. Collecting data on the content and types of posts shared by Facebook groups promoting discussion of anti-vaccine beliefs, concentrating</p>	<p>Groups serve as an “echo chambers” through “likes” and as a channel of disseminating fake news through “sharing”. Majority of the posts are from the same group of authors, which raises the concern of individuals reaching large audiences without editing or fact-checking.</p>
<p>Daley, Narwaney, Shoup, Wagner &amp; Glanz 2018</p> <p>Addressing parents’ vaccine concerns: a randomized trial of social media intervention</p>	<p>American Journal of Preventive Medicine</p>	<p>A three-arm randomized controlled trial</p>	<p>Self-efficacy around vaccine decision making improved among vaccine-hesitant parents while no intervention effect was observed among parents not vaccine-hesitant at baseline. Among vaccine-hesitant parents, an Internet-based intervention improved parents' attitudes about vaccines.</p>
<p>Donzelli, Palomba, Federgi, Aquino, Cioni, Verani, Carducci &amp; Lopalco 2018</p> <p>Misinformation on vaccination : A quantitative analyses of YouTube videos</p>	<p>The Journal of Human Vaccines &amp; Immuno-therapeutics</p>	<p>Quantitative analysis of 560 YouTube videos related to the link between vaccines and autism or other serious side effects on children.</p>	<p>Most of the videos were negative in tone and the number of videos increased during the considered period. The public institutions should establish information and videos to respond to questions of the public about vaccinations.</p>
<p>Evrony A. &amp; Caplan A. 2017</p> <p>The overlooked dangers of anti-vaccination groups' social media presence.</p>	<p>The Journal of Human Vaccines &amp; Immunotherapeutics</p>	<p>A review of a highly visible website “A Voice for Choice.”</p>	<p>The website promotes theories that are unsupported in the peer-reviewed, scientific literature, linking vaccines to several diseases and understating the importance of herd immunity.</p>

Study	Published	Method	Results
<p>Faasse K, Chatman CJ &amp; Martin LR.</p> <p>2016</p> <p>A comparison of language use in pro- and anti-vaccination comments in response to a high-profile Facebook post.</p>	<p>Vaccine - journal</p>	<p>Following a prominent Facebook post about childhood vaccination, analyzing language used by participants using LIWC (Linguistic Inquiry and Word Count). Percentage of words used across a number of categories was compared between pro-vaccination, anti-vaccination, and unrelated (control) comments.</p>	<p>Both groups used risk-related and causation words, and fewer positive emotion words. AV comments showed greater analytical thinking, lower authenticity, body and health references, and a higher percentage of work-related words. Pro-vaccination comments were more authentic, more tentative, and evidenced higher anxiety words, and more references to family and social processes in comparison to anti-vaccination comments.</p>
<p>Getman, Helmi, Roberts, Yansane, Cutler &amp; Seymour</p> <p>2018</p> <p>Vaccine Hesitancy and Online Information: The Influence of Digital Networks</p>	<p>Health education and Behavior</p>	<p>Media Cloud used for quantitative and qualitative study of an online media sample based on keyword selection. Through a hyperlink network map vaccine sentiment for a random sample was measured.</p>	<p>The most influential sources were in the health community. Some user generated sources had strong PV influence. The vaccine-hesitant community rarely interacted with PV content but used PV content within vaccine-hesitant narratives.</p>
<p>Hoffman BL, Felter EM, Chu KH, Shensa A, Hermann C, Wolynn T, Williams D. &amp; Primack BA.</p> <p>2019</p> <p>It's not all about autism: The emerging landscape of anti-vaccination sentiment on Facebook.</p>	<p>Vaccine - journal</p>	<p>Systematic analysis of content of individuals posting anti-vaccination comments in response to pro-vaccination comments. Analyzed by quantitative coding, descriptive and social network analysis, and an in-depth qualitative assessment.</p>	<p>5 distinct sub-groups labelled as "trust," "alternatives," "safety," and "conspiracy." Individuals' profiles found they tended to post material against other health-related practices such as water fluoridation and circumcision.</p>

Study	Published	Method	Results
<p>Kalimeri K, Beiro M, Urbinati A, Bonanomi A, Rosino A. &amp; Cattuto C.</p> <p>2019</p> <p>Human Values and Attitudes towards Vaccination in Social Media</p>	<p>Cornell University</p>	<p>Psychological, moral, and political opinion questionnaires were administered online, on Likeyouth1, gathering the self-reported psychological and opinion assessments on the Facebook Pages.</p>	<p>Vaccine hesitant people were less trusting towards the legal norms, had tendency to argue against newer lifestyles, defended the more traditional, religious and moral values and were open to experience traits and interested in topics like sports, hobbies and health.</p>
<p>Lutkenhaus RO, Jansz J. &amp; Bouman MP.</p> <p>2019</p> <p>Tailoring in the digital era: Stimulating dialogues on health topics in collaboration with social media influencers.</p>	<p>Digital Health - journal</p>	<p>Researchers used a set of custom scripts based on the rtweet package 56 to retrieve tweets in 2017 that included related Dutch words. A data set with 10,710 tweets was retrieved and then expanded to followers of the authors and so on in order to identify communities.</p>	<p>Health communication professionals and social influencers can collaborate to create health interventions tailored to the online communities. An analysis was made to identify communities, increase understanding of their health-related perceptions and identify social influencers as potential collaboration partners.</p>
<p>Okuhara T, Ishikawa H, Okada M, Kato M. &amp; Kiuchi T.</p> <p>2018</p> <p>Amount of Narratives Used on Japanese Pro- and Anti-HPV Vaccination Websites: A Content Analysis</p>	<p>Asian Pacific Journal of cancer prevention</p>	<p>Online searches by two major search engines (Google.jp and Yahoo!.jp). Identified websites were classified as “pro,” “anti,” or “neutral” depending on their claims and the number of narratives of people who experienced side effects of HPV vaccine or cervical cancer were counted.</p>	<p>A total 26% of anti websites posted narratives on side effects of HPV vaccination. No pro website posted narratives about having cervical cancer.</p>

Study	Published	Method	Results
<p>Orr D, Baram-Tsabari A. &amp; Landsman K.</p> <p>2016</p> <p>Social media as a platform for health-related public debates and discussions: The Polio vaccine on Facebook.</p>	<p>Israel Journal of Health Policy Research</p>	<p>Polio-related coverage from seven online Hebrew media platforms and the Facebook groups discussing the Polio vaccination were mapped and described. In addition, items from the Facebook group "Parents talk about Polio vaccination" were analyzed for socio-demographic and thematic characteristics.</p>	<p>321 commentators submitted 2289 comments, with 64 % by women, 92 % were parents, 13 % were physicians Half the doctors and 6 % of the non-doctors wrote over 10 items each. This Facebook group formed a platform where unmediated debates and discussions between the public and medical experts took place.</p>
<p>Schmidt AL, Zollo F, Scala A, Betsch A. &amp; Quattrociocchi W.</p> <p>2018</p> <p>Polarization of the vaccination debate on Facebook</p>	<p>Cornell University</p>	<p>Quantitative analysis on Facebook analyzing 2.6M users interacting with 298.018 posts over a time span of seven years and 5 months. Community detection algorithms used to detect automatically the emergent communities from the users' activity</p>	<p>Content consumption about vaccines is dominated by the echo-chamber effect and that polarization increased over years. Communities emerge from the users' consumption habits, i.e. the majority of users only consumes information in favor or against vaccines, not both.</p>
<p>Steffens MS, Dunn AG, Wiley KE. &amp; Leask J.</p> <p>2019</p> <p>How organizations promoting vaccination respond to misinformation on social media: a qualitative investigation.</p>	<p>BMC Public Health - journal</p>	<p>Using qualitative methods, sampled 21 participants from Australian organizations actively promoting vaccination on social media. Semi-structured, in-depth interviews to explore perspectives and practices. Framework Analysis was done to explore the data both inductively and deductively.</p>	<p>Organizations promoting vaccination face challenges on social media (misinformation, anti-science sentiment, a complex vaccination narrative and anti-vaccine activists). They developed a range of strategies in response (open communication in an evidence-informed way; safe spaces to encourage audience dialogue; fostering community partnerships; and countering misinformation with care)</p>

Study	Published	Method	Results
<p>Tomeny TS, Vargo CJ. &amp; El-Toukhy S.</p> <p>2017</p> <p>Geographic and demographic correlates of autism-related anti-vaccine beliefs on Twitter</p>	<p>Social Science and Medicine - journal</p>	<p>Using application programming interface (API) identified publicly available tweets that contained at least one autism spectrum disorder (ASD) and one vaccine-related search keyword. Search keywords that were used to retrieve tweets from Radian6.</p>	<p>Anti-vaccine tweets in certain areas were higher than the national average. Anti-vaccine tweet volume increased with news coverage of vaccine-related events. Monitoring social media is beneficial to curtail anti-vaccine beliefs.</p>
<p>Tustin, Crowcroft, Gesink, Johnson &amp; Keelan</p> <p>2018</p> <p>Internet Exposure Associated with Canadian Parents' Perception of Risk on Childhood Immunization: Cross-Sectional Study</p>	<p>JMIR Public Health and Surveillance</p>	<p>Analyses of two population samples: a self-selecting Web-based sample of Canadian parents recruited through Facebook and a population-based sample of parents recruited by random digit.</p>	<p>Vaccines were considered less safe by parents who used the Internet to search for vaccination information compared to parents who did not search the Internet</p>
<p>Tustin, Crowcroft, Gesink, Johnson, Keelan &amp; Lachapelle</p> <p>2017</p> <p>Facebook Recruitment of Vaccine-Hesitant Canadian Parents: Cross-Sectional Study</p>	<p>JMIR Public Health and Surveillance</p>	<p>Canadian parents recruited via targeted Facebook advertisements linked to a Web-based survey. Comparison of methodological parameters, key parental demographics, and three vaccine hesitancy indicators.</p>	<p>When compared with the RDD sampling strategy, more vaccine-hesitant parents were reached as well as younger parents with younger children. Facebook is a promising economical modality for reaching vaccine-hesitant parents for studies on the determinants of vaccine uptake.</p>



Study	Published	Method	Results
<p>Wiveh, Cooper, Jaca, Mavundza, Ndwandwe &amp; Wiysonge</p> <p>2019</p> <p>Social media and HPV vaccination: Unsolicited public comments on a Facebook post by the Western Cape Department of Health provide insights into determinants of vaccine hesitancy in South Africa</p>	<p>Vaccine - journal</p>	<p>Western Cape Department of Health's Facebook page announced the implementation of a school-based vaccination campaign of human papillomavirus (HPV) vaccine in public schools. The study identified determinants of vaccine hesitancy amongst responses provided by social media users to this post.</p>	<p>33% of responses were 'hesitant', suggesting that people with negative reactions were likely to be vocal deniers. Emerging themes included concern about safety and effectiveness of the vaccine. Factors increasing the willingness to be vaccinated were knowledge about cervical cancer, confidence in the effectiveness and safety of the vaccine, knowing the vaccine was being used in high income settings, and having strong recommendations from the WHO.</p>

## 6 RESULTS

The studies found in the review were grouped together by their qualitative content, so that the main groups of results could be identified. Most of the studies had similar results, only the audience features differed between the studies. The four groups of main results are introduced in the subtitles of this chapter.

Public Health Officials are worried about the influence of "fake news" and misinformation in social media (CDC.2019; Chaib. 2019). In US only 40% of consumers say that the information in social media affects the way they deal with their health related issues and 30% of consumers state that social media is their main source of information. While mainstream popular media news sites contained vaccine information from sources like the Ministry of Health, CDC and WHO, with guidelines, interviews of officials and formal positions, social media platforms offered vaccine information in form of debates, discussions and common positions, expressing fears, confusion and hesitancy. Especially anti-vaccination (AV) groups have harnessed the power of social media to promote their cause. (Chiou & Tucker. 2018; Evrony & Caplan. 2017; Tustin et al. 2017.)

### 6.1 Recognised features of AV and PV groups

In this study I have used "pro-vaccination group" in accordance with some of the studies found. "Pro-vaccination group" in this context means groups that are not vaccine hesitant, and "pro-vaccination information" means vaccine information as given by legitimate sources.

Both, anti- and pro-vaccination groups posted information about vaccinations, but while pro-vaccination (PV) groups concentrated more on scientific studies, the AV groups shared negative experiences. PV groups did not utilize all the resources they could have, for example linking existing websites with positive experiences and responding in PV groups the negative experiences and misinformation posted in AV groups. The tone of the PV groups was found calmer and fact based, compared to provocative and persuasive style of AV groups. While PV groups promote communication with openness and evidence-based information, the AV groups respond with misinformation and anti-science sentiment. AV activists were found sophisticated and crafty operators, who believed in their mission and used various strategies to exert influence. While PV groups emphasized

concepts of children and parents, love, misinformation and unitedness, AV groups focused on free choice, purpose, obligation and power and they show more commitment to the consumption of their posts. (Evrony & Kaplan. 2017; Kalimeri et al. 2019; Okuhara et al. 2017; Orr et al. 2016; Schmidt et al. 2018; Steffens et al. 2019; Tustin et al. 2017.)

PV strategies were discussed in several studies. Scientific evidence and facts were found as one of the most important factors in promoting vaccinations, though the status of scientific knowledge has been diminished in the past years. In order to satisfy the information, need of the audiences, the complex facts had to be communicated in a simplified, straightforward manner. The scientific facts were found impersonal at times, and personal stories that humanized the threat of disease offered a more emotionally satisfying experience. Fighting the misinformation was relying on vaccine-accepting members of social media groups, yet only small amount of audience responded to misinformation immediately. A safe space, where questions can be asked and answered without attacks from AV activists was found necessary in order to boost neutralizing misinformation and improving vaccination attitudes in hesitant audience. (Daley et al. 2018; Steffens et al. 2019.)

## 6.2 Misinformation

Easily accessible misinformation is one of the biggest threats in social media. However, AV groups are not solely responsible for that, but other social media users admitted sharing poor quality information unwittingly. The misinformation often appeared credible, and since social media does not request any support on claims published, the misinformation often passes as facts. PV groups were found to be more active generally, but AV groups were active in majority of debates, receiving more comments and offering more information, including misinformation. There was also a difference noted in the language used in AV and PV comments. Av comments, even if lacking scientific base, showed more analytical thinking and references to body and health than those of PV groups. In addition, AV comments showed greater anxiety and focus on family and social processes, hence supporting the worries of vaccine hesitant audience. (Donzelli et al. 2018; Evrony & Kaplan. 2017; Faasse. 2016; Hoffman et al. 2019; Schmidt et al. 2018; Steffens et al. 2019.)

Anti-science sentiment can be seen in social media sites as resistance to mainstream expertise and skepticism on scientific evidence. The integrity of health care professionals and especially vaccine science was often questioned, and the knowledge of "white coats" against "mothers" when thinking what is best for a child, was challenged. Scientific information was also found too complex and uncertain, while straightforwardness, clarity and simplicity would have been better received. Still, though there was very little interaction between AV and PV context, AV community used primary PV content in vaccine-hesitant narratives. (Evrony & Kaplan. 2017; Getman. 2018; Steffens et al. 2019.)

### 6.3 Audience features

The audiences found most susceptible to AV messages were the "information seekers". While they would have been amenable to correct and scientifically valuable information, the activity of AV groups got to them first. Another vulnerable group was the "silent audience", the observers who did not want to make themselves visible in the fear of an attack from the AV groups. In the Steffens et al. 2019. study, the participants, who were monitoring PV information in social media, felt that their role and responsibility was to find and share high standard information in social media, to guide the audience from misinformation to easily understandable scientific information. They felt that being rational, objective and evidence based as well as being level-headed in interactions with activists, were important characteristics in order to build trust. Tracking and monitoring conversations in social media, both AV and PV, could help understand the strategies both groups use and hence develop strategies to balance the scale between AV and PV information spread.

The demographics of AV groups had also been studied to some extent and certain characteristics could be pointed out in AV social media groups. Tomeny et al (2017) found an increase of AV tweets in women who had given birth in the last 12 months, households with over \$200 000 income and in males who attended college for one year without receiving a degree. Also, a predictor of AV-tweet activity recognized was race, while Asian race was significantly associated with AV tweets, other races (Latinos, African American and non-Hispanic Whites) were not.

According to Kalimeri et al. (2019) political values were not found a significant value, even though AV groups seemed to trust governmental norms less and support freedom of

expression and religious beliefs. AV groups were also found more conscious, while PV groups were more agreeable. Neuroticism was equal in both groups. Interests of groups did not differ significantly, but AV groups were slightly more interested in travel, sports, culture, and health. PV groups were slightly more interested in science. Hoffman et al. (2019) that majority of AV individuals in Facebook were female, with an occupation and/or post-secondary education, over half being Trump supporters. The AV posts were mainly about "educational material", "media, censorship and cover-up" and "vaccines cause idiopathic illness".

Tustin (2018) studied searching of vaccine information, by analyzing web-based survey data and population-based random digit dialing data. They found that although the Internet has been considered an important data source on the risk on childhood immunizations, compared to parents who did not search vaccine information in the Internet, the information received was significantly similar, and the vaccines were perceived "not safe" in both groups. The two groups did have some differences in features. The group that answered the web-based survey, was mainly under 35 years old, female, with higher education and two or less children. The group with population-based random digit dialing data was over 40 years old, mostly male and had children older than 8.3 years.

Wiyeh et al (2019) found in their study about HPV vaccination campaign in South-Africa by monitoring responses in the campaigns Facebook post. Even though majority of reactions seemed to be favorable to the campaign, the hesitant minority was more active in expressing their concerns about the effects of the vaccine on reproductive health, girls being used for research, vaccine effectiveness and risk-benefit ratio.

#### 6.4 Social media as a solution to vaccine hesitancy

Social media has changed their functions in order to decrease the spread of misinformation. After Facebook banned all AV advertising, the shares of misinformation declined 75%, while in Twitter, not declining AV advertising the shares remained the same. Studies suggest that audience learns effectively through social media, and it should be used more effectively to spread accurate information. (Chiou & Tucker. 2018; Lutkenhaus et al. 2019.)

Using social media to expose audience to content that promotes PV attitudes is an opportunity that has been underused. First intervention could be promoting media literacy, that would teach the audience better evaluate the AV content of social media. In addition, using entertainment narratives of health has been shown to influence viewers' knowledge and perception on health topics as well as targeted health communication campaigns offering accurate information. Overall, the activity of medical professionals in social media needs to increase to balance the AV and PV information output. (Hoffman et al. 2019; Lutkenhaus et al. 2019.)

The status of scientific knowledge, evidence and facts has diminished, but they are still important tools in decreasing the concerns of the audience. Misinformation can be battled with communicating facts and information, but this has to be done by using straightforward language. Offering emotional stories to support the facts may reach an even larger audience, since personal stories offer a more emotionally satisfying experience. Tracking and monitoring the conversations in social media could help understand the demographics and the needs of the groups and answer the concerns in a well targeted manner. (Steffens et al. 2019.)

Though social media has already banned AV advertising and AV groups, the comments on these groups were found to be a good base for the PV information responses. AV information brought out the fears, concerns and misinformation that needed to be responded directly in order to decrease all three. At the same time AV groups brought to light the hesitant audience most at risk, since their search for information had led them to AV groups. (Chiou & Tucker. 2018; Lutkenhaus et al. 2019; Steffens et al. 2019.)

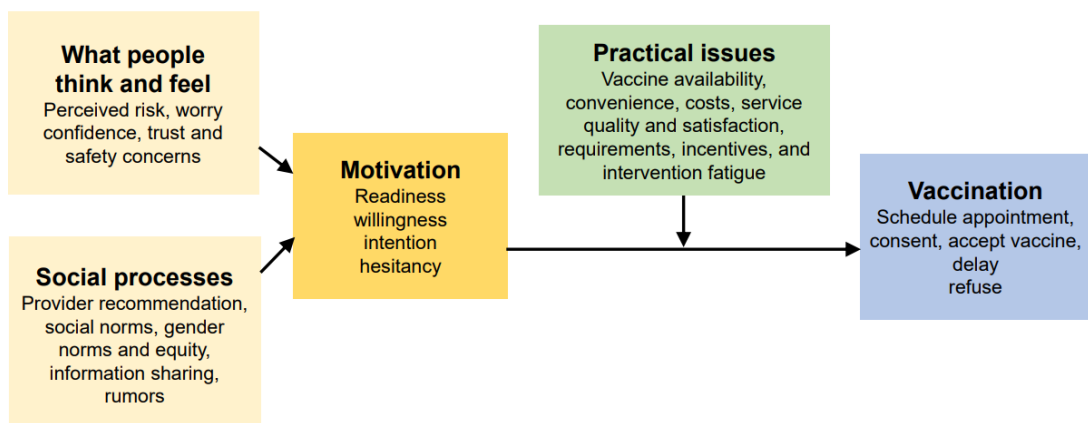
## 7 DISCUSSION AND CONCLUSIONS

To increase vaccination uptake and address vaccine hesitancy, WHO has developed an increasing vaccination model to understand determinants of vaccine hesitancy, tailor strategies for better uptake and monitor and evaluate the impact and sustainability of the interventions.

The role of social media affects mostly the social processes in the framework. The recommendations, experiences, rumors and received information in the social processes, affect the motivation of the person, increasing or decreasing their hesitancy, fears and concerns and hence readiness and willingness to receive vaccinations. Practical issues may still affect the motivation of a person, especially if hesitant at this point of the process.

The points where active intervention from health care professionals could resolve the situation for the best are easy to spot in the framework. The practical issues affecting vaccine uptake are also clearly stated and should be considered by health care professionals as vital factors in vaccine promotion. Though the practical issues can alone affect vaccine uptake, they can also affect the attitudes towards vaccinations. It is hard to determine how many vaccine hesitant people choose against vaccinations due to costs or difficulty accessing vaccinations, and on the other hand how many PV people do not have access or can not afford the vaccinations they would prefer to take.

Picture 3. Increasing vaccination model (WHO. 2017)



## 7.1 Community development

When vaccination coverage reaches a high level, bigger amount of people is protected from diseases. Recently there has been cases where certain communities, for example, for religious reasons are refusing vaccinations, and the once eradicated diseases start to make a return. In New York 2019, a measles outbreak started from an Orthodox Jewish community. The community has refused measles vaccinations for religious reasons. In this case, the refusal lead to the city seeing more measles cases than in last 30 years, mostly in the community itself.

However, the measles outbreak lead to CDC recommendations that the children outside of the community needed to be vaccinated earlier than the normal vaccination schedule recommends. This puts children at risk, due to the passive immunity they still may have left from the mothers. When the antibodies received from a mother are still around when the baby gets their measles vaccine, the antibodies can "neutralize" the vaccination, preventing it from provoking the immune system response to protect the baby in the future (Becker. 2019).

Would understanding the risk caused to other children as well as to the children of the community weigh in the scale against religious beliefs? Could co-operation with the community leaders help find a way to respect the human rights and the beliefs of the community while protecting the human rights and health of other communities? Can PV information reach these groups or would there be more effective way to inform these communities.

## 7.2 Human rights and vaccinations

Anti-vaccine movement is a complex concept. It is understandable that in the shadow of history of vaccination mishaps, vaccinations raise fears, concerns, hesitation and even anxiety. People need a channel to express these feelings and have a right to do so. AV groups, however, actively try to convince hesitating parents to decide against vaccinations by providing misinformation, and by doing so effect peoples' possibility of making an informed decision. They aim for the feelings, making parents feel like bad parents for making "wrong" decisions, while violating the right for informed decisions. Since AV groups, according to this thesis are convinced of their cause, seem to consider the



misinformation facts, and hence believe they are protecting the rights and safety of children, can they be accused of violating human rights in the sense of risking the health of the children. In these cases do human rights of the parent collide with the human rights of the child?

Vaccinations seem to be considered a grey area when considering parents rights to decision against childrens rights to protection. For example, there are countries where circumcision of baby boys is illegal due to the child's right to protection, yet parents may refuse vaccinations. Unicef (2019) states that "Children are neither the possessions of parents nor of the state, nor are they mere people-in-the-making; they have equal status as members of the human family." They start life as dependent beings, and rely on adults for the nurture to grow. If such nurture is not found from adults in children's families, it is up to the State to find an alternative to secure the best interests of the child. Some countries have made vaccinations mandatory in order for the children to enter daycare or schools. Though this may seem like a violation of human rights of an individual's right to decide about their body and health, it clearly protects the right of many others by securing the safety of children in the communities.

Notable fact about AV parents is that they strongly believe they are protecting the safety of their children by not vaccinating them. They do not believe they are putting their children at risk and hence violating the human rights of the child. In order to convince them about the safety of vaccinations and vaccinations protecting their child's health, information needs to be provided. Since the information provided currently does not respond to their need of understanding about vaccinations, some development needs to be done either in the form or provision of information.

### 7.3 Freedom of speech and responsibilities

For some reason AV content seems to spread easier than PV content. Studies show that sharing a negative attitude has more capacity to change attitudes of others to a negative direction than sharing a mixed or a positive attitude. Sharing negative attitudes seems to boost self-esteem of the sharing individuals and establish in-group sensation which sharing positive attitudes does not do (Bosson et al. 2006; Yoo. 2009.) Is this a part of AV content attracting the audience, or is there more to it? Is freedom of speech and choice

a more driving factor than actual concern about vaccination safety? How much does belonging into a community affect people's choices in the matter?

The main responsibility of spreading correct information is on health care professionals. Not only in contact with their own patients, but in providing information in social media. Social media is the major information source to young adults and new parents. There is a lack of knowledge in judging the information provided and the sources it is coming from. This needs to be balanced with easy access to scientific information, which then needs to be in a form for people to understand it. This task may be hard, since attitudes towards health care professionals, vaccine manufacturers and scientists has already suffered a major drop and beliefs about their actions has advanced to paranoia. Also, openness about risks related to vaccines does not ease the burden of PV work, but is necessary in order to gain the trust of the audience. Right now the human right to make an informed decision is suffering in the hands of AV propaganda, which is so much easier accessible than PV information.

Training of health care professionals in this matter is important, since AV attitudes are also found amongst them. It is an ethical dilemma whether a health care professional has a right to refuse vaccinating or right to express their own visions about vaccination safety, though in professional surroundings duty of care, duty to protect and duty to cause no harm should override the right to express personal opinions. Adequate training and possibility to have answers to concerns, would help health care professionals to carry out these duties when hesitant.

#### 7.4 Limitations

On hindsight, the use of search words could have been wider. The difference between vaccine and vaccination is often unclear to people, and although it is fairly safe to assume that the conductors of scientific studies have chosen the correct terms, using these words in wider perspective could have been beneficial. Immunization as a search word was left out. It points to the action of making a person immune to infection, which is done by vaccinating. In this case hesitancy was considered to be towards vaccinating process more than immunity to infections itself.

Literature search was done on a short timeframe instead of repetitive searches on a longer timeframe. The amount and scope of studies could have been larger in order to produce as unambiguous information as possible. However, the studies found were similar in context, so results are considered to be reliable.

### 7.5 Further studies

In January 2020, a quick check on the social media sites revealed that Facebook offers only professional sites when searching groups with searchwords "vaccine hesitancy" and "antivaccine". Facebook offers links to CDC and WHO pages, and several other sites ran by medical professionals or organisations. Quick search in Instagram with "vaccine" searchword finds fiftysix (56) users, out of which 8 are not links to vaccinations at all, seven are PV and fortyone (41) AV related.

In the future, understanding better not only the sources of information, but also the demographics of the groups by conducting an interview or a questionnaire based study, could be beneficial in order to invent better targeted interventions.

### 7.6 Professional development

This thesis process developed further my ability to critically review the available information. The subject was more complex than my previous subjects, since both AV and PV information come from both authoritative and unofficial sources, and the information available was often "colored" by strong emotions. The human rights aspect taught me a lot about the complexity of human rights issues, how actualizing someone's rights may violate someone else's and how complicated protecting rights of those who are unable to express their will, can be.

It was interesting to learn how conflict resolution methods work perfectly well on vaccine hesitancy, though resistance to conflict resolution may be stronger than usual. Also the aspect of community development got a whole new meaning when considering developing communities that function according to their beliefs and culture. The thesis process definitely further widened my perspective of the master's degree programmes themes, as well as made it clear how complicated and complex these themes are.

As a health care professional the thesis widened my understanding on the concerns and worries people have about vaccinations. Though it may be hard to understand from a professional's point of view, the fears are very real to the vaccine hesitant people. This is also a matter related to many cultural, religious and ethnic beliefs, that often stand in the way of process. The importance of understanding those issues and addressing them accordingly became clearer to me.

## ANNOTATIONS AND ABBREVIATIONS

AV	Anti-vaccination, attitudes against vaccinations including vaccine hesitancy
CDC	Center for Disease Control and Prevention
Herd-immunity	The resistance to the spread of a contagious disease within a population that results if a sufficiently high proportion of individuals are immune to the disease, especially through vaccination
HPV	Human Papilloma Virus
Misinformation	False or inaccurate information, especially that which is deliberately intended to deceive
MMR	Measles, Mumps, Rubella
Non-vaxxer	Social media term for someone refusing to vaccinate their children
PV	Pro-vaccination, attitudes supporting vaccinations
Vaccination	The administration of a vaccine
Vaccine	A substance used to stimulate the production of antibodies and provide immunity against one or several diseases
WHO	World Health Organization

## REFERENCES

- Becker R. (2019). New York state is allowing early vaccination for infants to combat measles outbreaks. Retrieved from:  
<https://www.theverge.com/2019/5/1/18524877/measles-outbreaks-vaccines-mmr-new-york-city-brooklyn-six-months> (30.01.2020)
- Bosson J, Johnson A, Niederhoffer K. & Swann W. (2006). Interpersonal chemistry through negativity: Bonding by sharing negative attitudes about others. Retrieved from: <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1475-6811.2006.00109.x> (22.02.2020)
- Bozzola E, Spina G, Russo R, Bozzola M, Corsello G. & Villani A. (2018). Mandatory vaccinations in European countries, undocumented information, false news and the impact on vaccination uptake: the position of the Italian pediatric society. *Italian Journal of Pediatrics*. 2018; 44: 67.
- Brunson. E.K. (2013). The Impact of Social Networks on Parents' Vaccination Decisions. Retrieved from:  
<https://pediatrics.aappublications.org/content/131/5/e1397?download=true> (23.12.2019)
- CDC.( 2019). Vaccinate with Confidence. Retrieved from:  
<https://www.cdc.gov/vaccines/partners/vaccinate-with-confidence.html> (3.2.2020)
- CDC.( 2019). Why Are Childhood Vaccines So Important? Retrieved from:  
<https://www.cdc.gov/vaccines/vac-gen/howvdp.htm> (30.01.2020)
- Chaib F. 2019. Vaccine Misinformation: Statement by WHO Director-General on Facebook and Instagram. Retrieved from: <https://www.who.int/news-room/detail/04-09-2019-vaccine-misinformation-statement-by-who-director-general-on-facebook-and-instagram> (3.2.2020)
- Charter of Fundamental Rights of the European Union. (2000). Official Journal of the European Communities. Retrieved from:  
[http://www.europarl.europa.eu/charter/pdf/text\\_en.pdf](http://www.europarl.europa.eu/charter/pdf/text_en.pdf) (02.01.2020)
- Chiou L. & Tucker C. (2018). Fake news and advertising on social media: A study of the anti-vaccination movement. Retrieved from:  
<https://www.nber.org/papers/w25223> (23.12.2019)

- Daley M.F, Narwaney K.J, Shoup J.A, Wagner N.M. & Glanz J.M. (2018). Addressing Parents' Vaccine Concerns: A Randomized Trial of a Social Media Intervention. *American Journal of Preventive Medicine*. 2018 Jul;55(1):44-54 (24.12.2019)
- Daudt H., van Mossel C. & Scott S. (2013). Enhancing the scoping study methodology: a large, inter-professional team's experience with Arksey and O'Malley's framework. Available at <https://bmcmedresmethodol.biomedcentral.com/articles/10.1186/1471-2288-13-48> (19.12.2019)
- Davis M. (2019). Globalist war against humanity shifts into high gear': Online anti-vaccination websites and 'anti-public' discourse. *Public Understanding of Science*. 2019 Apr;28(3):357-371.
- Donzelli G, Palomba G, Federgli I, Aquino F, Cioni L, Verani M, Carducci A. & Lopalco P. (2018). Misinformation on vaccination: A quantitative analysis of YouTube videos. *Human Vaccines and Immunotherapeutics*. 2018; 14(7):1654-1659
- Dube E, Laberge C, Guay M, Bradamat P, Roy R.& Bettinger J. (2013). Vaccine Hesitancy. *Human Vaccines and Immunotherapeutics*. 2013 Aug 1; 9(8): 1763-1773 (24.12.2019)
- ECDC. (2015). Vaccine hesitancy among healthcare workers and their patients in Europe. A qualitative study. Retrieved from: <https://www.ecdc.europa.eu/sites/default/files/media/en/publications/Publications/vaccine-hesitancy-among-healthcare-workers.pdf> (26.12.2019)
- Edwards K.M. & Hackell J.M. (2016). Countering vaccine hesitancy. Retrieved from: <https://pediatrics.aappublications.org/content/early/2016/08/25/peds.2016-2146>. (26.12.2019)
- Evrony A. & Caplan A. (2017). The overlooked dangers of anti-vaccination groups' social media presence. *Human vaccines and immunotherapeutics*. 2017. Jun.;13 (6): 1475-1476 (23.12.2019)
- Faasse K, Chatman C.J & Martin L.R. (2016). A comparison of language use in pro- and anti-vaccination comments in response to a high profile Facebook post. Retrieved from: <http://www.nitag-resource.org/uploads/media/default/0001/03/c57992529df06f6cdba7c310ddbcf996e707a72e.pdf> (23.12.2019)

- Getman R, Helmi M, Roberts H, Yansane A, Cutler D. & Seymour B. (2018). Vaccine Hesitancy and Online Information: The Influence of Digital Networks. *Health Education and behavior*. 2018 Aug;45(4):599-606
- Healy M. 2014. Commentary on “Parental vaccine-hesitancy: Understanding the problem and searching for a resolution”. Retrieved from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4975067/> (3.2.2020)
- Hoffman B.L, Felter E.M, Chu K.H, Shensa A, Hermann C, Wolynn T, Williams D. & Primack B.A. (2019). It's not all about autism: The emerging land-scape of anti-vaccination sentiment on Facebook. Retrieved from: <https://www.sciencedirect.com/science/article/pii/S0264410X19303032> (23.12.2019)
- Hussain A, Ali S, Ahmed M. & Hussain S. (2018). The Anti-vaccination Movement: A Regression in Modern Medicine. *Cureus*. 2018 Jul; 10(7): e2919 (23.12.2019)
- Jarrett C, Wilson R, O’Leary M, Eckerberger E. & Larson H. (2015). Strategies for addressing vaccine hesitancy – A systematic review. Retrieved from: <https://www.sciencedirect.com/science/article/pii/S0264410X15005046> (3.2.2020)
- Kalimeri K, Beiro M, Urbinati A, Bonanomi A, Rosino A. & Cattuto C. (2019) Human Values and Attitudes towards Vaccination in Social Media. Retrieved from: <https://arxiv.org/pdf/1904.00691.pdf> (27.12.2019)
- Levac D., Colquhoun H. & O'Brien K. (2010). Scoping studies: advancing the methodology. *Implementation Science*. 2010; 5: 69. (20.12.2019)
- Lutkenhaus R.O, Jansz J. & Bouman M.P. (2019). Tailoring in the digital era: Stimulating dialogues on health topics in collaboration with social media influencers. Retrieved from: <https://journals.sagepub.com/doi/10.1177/2055207618821521> (23.12.2019)
- McKee C. & Bohannon K. (2016). Exploring the reason behind parental refusal of vaccines. *The journal of pediatric pharmacology and therapeutics*. 2016. Mar-Apr; 21 (2): 104-109 (23.12.2019)
- Okuhara T, Ishikawa H, Okada M, Kato M. & Kiuchi T. (2018). Amount of Narratives Used on Japanese Pro- and Anti-HPV Vaccination Websites: A Content Analysis. Retrieved from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6291053/> (23.12.2019)



- Orr D, Baram-Tsabari A. & Landsman K. (2016). Social media as a platform for health-related public debates and discussions: the Polio vaccine on Facebook. Retrieved from: <https://www.ncbi.nlm.nih.gov/pubmed/27843544> (23.12.2019)
- Ortutay B. 2019. How social media is trying to contain misinformation over vaccines. Retrieved from: <https://www.pbs.org/newshour/health/how-social-media-is-trying-to-contain-the-spread-of-misinformation-over-vaccines> (26.12.2019)
- Parasidis E. & Opel D. (2017). Parental Refusal of Childhood Vaccines and Medical Neglect Laws. *American Journal of Public Health*. 2017 January; 107(1): 68–71.
- Peters M.D, Godfrey C.M, Khalil H, McInerney P, Parker D. & Soares C.B. (2015). Guidance for conducting systematic scoping reviews. *International Journal of Evidence Based Healthcare*. 2015 Sep;13(3):141-6. (23.12.2019)
- Pugliese-Garcia M, Heyerdahl L, Mwamba C, Nkwemu S, Chilengi R, Demolis R, Guillermet E. & Sharma A. (2018). Factors influencing vaccine acceptance and hesitancy in three informal settlements in Lusaka, Zambia. *Vaccine*. 2018 Sep 5; 36(37): 5617-5624
- Raluca-Nicoleta R. (2016). Rational Decision Making, the Anti-Vaccination Movement and Counter Reactions on Social Media. Retrieved from: [https://www.researchgate.net/publication/310831776\\_Rational\\_Decision\\_Making\\_the\\_Anti-Vaccination\\_Movement\\_and\\_Counter\\_Reactions\\_on\\_Social\\_Media](https://www.researchgate.net/publication/310831776_Rational_Decision_Making_the_Anti-Vaccination_Movement_and_Counter_Reactions_on_Social_Media) (23.12.2019)
- Schmidt A.L, Zollo F, Scala A, Betsch A. & Quattrociocchi W. (2018). Polarization of the vaccination debate on Facebook. Retrieved from: <https://arxiv.org/abs/1801.02903> (27.12.2019)
- Smith T. (2017). Vaccine rejection and hesitancy: a review and call to action. *Open Forum Infectious Diseases*. 2017 Summer; 4(3): ofx146 (24.12.2019)
- Steffens MS, Dunn A.G, Wiley K.E. & Leask J. (2019). How organisations promoting vaccination respond to misinformation on social media: a qualitative investigation. Retrieved from: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-7659-3> (23.12.2019)

- Tate J. (2019). Can social media have a role in tackling vaccine hesitancy? Retrieved from:  
[https://www.healthpolicypartnership.com/can\\_social\\_media\\_have\\_role\\_vaccine\\_hesitancy/](https://www.healthpolicypartnership.com/can_social_media_have_role_vaccine_hesitancy/) (26.12.2019)
- THL. (2020). Miksi rokotuksia tarvitaan? Retrieved from:  
<https://thl.fi/fi/web/infektioaudit-ja-rokotukset/tietoa-rokotuksista/miksi-rokotuksia-tarvitaan-> (30.01.2020)
- Tomeny T.S, Vargo C.J. & El-Toukhy S. (2017). Geographic and demographic correlates of autism-related anti-vaccine beliefs on Twitter. Retrieved from:  
<https://www.ncbi.nlm.nih.gov/pubmed/28926775> (23.12.2019)
- Tustin J.L, Crowcroft N.S, Gesink D, Johnson I. & Keelan J. (2018). Internet Exposure Associated With Canadian Parents' Perception of Risk on Childhood Immunization: Cross-Sectional Study. *JMIR Public Health and Surveillance*. 2018 Jan-Mar; 4(1): e7
- Tustin J.L, Crowcroft N.S, Gesink D, Johnson I, Keelan J. & Lachapelle B. (2017). Facebook Recruitment of Vaccine-Hesitant Canadian Parents: Cross-Sectional Study. *JMIR Public Health and Surveillance*. 2017 Jul 24;3(3):e47
- Unicef. (2019). Child rights and why they matter. Every right, for every child. Retrieved from: <https://www.unicef.org/child-rights-convention/child-rights-why-they-matter> (23.01.2020)
- United Nations. (2019). Sustainable Development Goals. Retrieved from:  
<https://www.un.org/sustainabledevelopment/health/> (02.01.2020)
- United Nations. (1948). Universal Declaration of Human Rights. Retrieved from:  
<https://www.un.org/en/universal-declaration-human-rights/index.html>  
(02.01.2020)
- Vasconcellos-Silva P.R, Castiel L.D. & Griep R.H. (2015). The media-driven risk society, the anti-vaccination movement and risk of autism. Retrieved from:  
<https://www.ncbi.nlm.nih.gov/pubmed/25715154> (23.12.2019)
- WHO. (2013). What influences vaccine acceptance: A model of determinants of vaccine hesitancy. Retrieved from: [https://www.who.int/immunization/sage/meetings/2013/april/1\\_Model\\_analyze\\_driversofvaccineConfidence\\_22\\_March.pdf](https://www.who.int/immunization/sage/meetings/2013/april/1_Model_analyze_driversofvaccineConfidence_22_March.pdf) (26.12.2019)

- WHO. (2018). Immunizations. Retrieved from: <https://www.who.int/topics/immunization/en/> (30.01 2020)
- WHO. (2019). Ten threats to global health in 2019. Retrieved from: <https://www.who.int/emergencies/ten-threats-to-global-health-in-2019> (02.01.2020)
- Williamson L & Gaab H. (2018). Addressing vaccine hesitancy requires an ethically consistent health strategy. Retrieved from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6201581/> (3.2.2020)
- Wiyeh A.B, Cooper S, Jaca A, Mavundza E, Ndwandwe D. & Wiysonge C.S. (2019). Social media and HPV vaccination: Unsolicited public comments on a Facebook post by the Western Cape Department of Health provide insights into determinants of vaccine hesitancy in South Africa. *Vaccine*. 2019 Oct 8;37(43):6317-6323 (24.12.2019)
- Wong J.C. (2019). Pinterest's new vaccine search will offer something rare on social media: facts Retrieved from: <https://www.theguardian.com/society/2019/aug/28/pinterest-anti-vaccine-combat-health-misinformation> (26.12.2019)
- Xu Z, Ellis L. & Umphrey L.R. (2019). The Easier the Better? Comparing the Readability and Engagement of Online Pro- and Anti-Vaccination Articles. Retrieved from: <https://journals.sagepub.com/doi/full/10.1177/1090198119853614> (23.12.2019)
- Yoo J. (2009). The Power of Sharing Negative Information in a Dyadic Context. Retrieved from: <https://www.tandfonline.com/doi/abs/10.1080/08934210902798510> (22.01.2020)

