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# Vaccine Hesitancy: Causation and Impact

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# The Causes of Vaccine Hesitancy and their Exacerbation by Social Media

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## OVERVIEW:

I will be analyzing both qualitative and quantitative data surrounding these diseases over time, to aim to find the underlying reasons for vaccine hesitancy, establish whether there is an ultimate cause, and propose methods which can be used to combat fear or distrust in vaccinations.

## PURPOSE:

This project explores vaccine hesitancy, people's delay or refusal to get vaccinated although vaccination is available. Vaccine hesitancy and especially parental vaccine hesitancy is a topic which has been gaining attention in the past few years as more people are choosing to not be vaccinated or get their children vaccinated. By refusing vaccination, not only are they at risk, but it becomes a matter of public health risk. This has been a problem with previous vaccines such as the MMR vaccine and the HPV vaccine, but it has become a more prevalent problem with regards to the COVID pandemic and vaccine.

## RESEARCH QUESTIONS:

- Which reasons exist for vaccine hesitancy concerning the HPV vaccine?
- Which reasons exist for vaccine hesitancy concerning the MMR vaccine?
- What reasons exist for COVID vaccine hesitancy?
- Do reasons behind hesitancy coincide for these multiple vaccines?
- How does the media contribute to the spread of vaccine hesitancy?
- What methods to combat vaccine hesitancy exist?

## FINDINGS:

Vaccine hesitancy arises due to reasons such as misinformation about vaccines, social stigma surrounding them, the level of education received by parents, public policy concerning vaccination mandates, and a lack of communication or miscommunication with healthcare providers. These reasons can be seen for the HPV, MMR, and COVID vaccines, and media contributes to and spreads these narratives.

**Figure 2.** Relative frequency of tweets classified as neutral, positive, and negative (June 2011–April 2019).

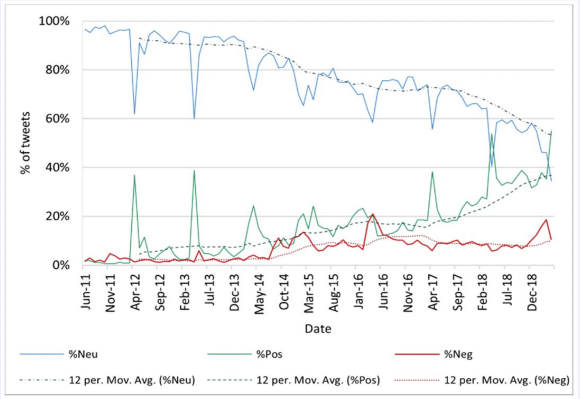


Table 2. Eight examples of topics related to vaccine hesitancy found using the Top2Vec model. The first column lists labels assigned by the researchers as human interpretations of the topics. The second column lists the top 20 words in order of descending probability

| Table 2 | |
|---|---|
| Topic | Top 20 most probable words |
| Alternative COVID treatments, rushed development | hcq, ivermectin, cheap, vitamin, treatment, cure, experimental, treat, proven, pharma, untested, drugs, eua, drug, treating, rushed, widely, pushing, expensive |
| Belief that vaccine is experimental/untested | traditional, guinea, genetic, technology, mrna, rna, gene, untested, experimental, cells, modified, vector, liability, proven, injected, therapy, toxic |
| Low Personal Risk | survival, rate, experimental, chances, yourself, subject, chance, untested, unknown, catching, liability, term, higher, mortality, pose, therapy, gene, protect, healthy, injuries |
| AZ/Oxford Vaccine Side Effects | clots, clot, blood, suspended, clotting, astrazeneca, suspends, denmark, suspend, norway, reports, netherlands, european, temporarily, france, halted, evidence, fears, germany, italy |
| Skepticism based in semantics over FDA Approval vs EUA | fda, approved, authorization, emergency, drug, authorized, use, eua, johnson, approval, liability, approves, licensed, trials, authorizes, cleared, single, regulator, prevent, regulators |
| Side Effects related to autoimmune reactions | autoimmune, trigger, disease, protein, cells, immune, causes, mrna, clotting, rna, mmr, lung, cause, diseases, spike, cov, anaphylaxis, evidence, condition, sars |
| Belief that vaccines are a bioweapon | realise, ffs, bio, weapon, sound, transmit, yourself, lockdowns, mutates, eliminate, toxic, logic, forever, humans, cure, unknown, gonna, understand, biotech, viruses |
| Belief that vaccine is experimental/untested | guinea, pigs, poison, thailand, indians, trial, traditional, spreads, theirs, adverse, clinical, netherlands, experimental, omg, southern, forced, rushed, untested, covaxin, trials |

## METHODS:

For this study I conducted a literature review. I looked at articles concerning these specific vaccines and hesitancy surrounding them. I decided on the MMR and HPV vaccines as ones to look at since I have heard previous doubts about their safety and validity, with the MMR vaccine specifically causing a lot of controversy over the years. By examining the reasons for hesitancy surrounding those, I was able to pinpoint find which concerns about both vaccines are most common, and which are shared among the vaccines. I then looked at articles and data analysis studies focused on the COVID vaccine and compared causes of it with what I found concerning the MMR and HPV vaccines to see which overlap. Also, I looked at studies to find which methods are most effective in preventing this.

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