Social media echo chambers spread vaccine misinformation: study
18 February 2022, by Hanne Kokkegård

WHO has named vaccine hesitancy one of the greatest threats to global health. Nonetheless, some people are hesitant or refuse to get vaccinated because they do not trust vaccines and health authorities. A new research result from DTU, published in the journal *PLOS One*, shows that misinformation on social media contributes to this distrust and creates a false image of benefits and disadvantages concerning vaccines.

"Where vaccine supporters often refer to news media and science sites when sharing knowledge about vaccines on Twitter, we can see that profiles belonging to anti-vaccine profiles far more often share links to YouTube videos and to sites that are known to spread fake news and conspiracy theories, which previous research has also shown," says Bjarke Mønsted who holds a Ph.D. from DTU Compute. He continues:

"Furthermore, vaccine opponents profiles often link to commercial sites that sell alternative health products. This is surprising given that vaccine hesitancy often stems from a fear of financial conflicts of interest. Particularly because previous research has shown that 12 people globally are responsible for vaccine misinformation, including people who earn a fortune from the sale of alternative health products."

Along with Sune Lehmann from the Research Section for Cognitive Systems at DTU Compute, Bjarke Mønsted has analyzed some 60 billion tweets written before the pandemic to understand where the discussion about vaccines takes place on Twitter to better understand today's vaccine hesitancy on social media.

Anti- and pro-vaxxers do not talk to each other

Using newly developed methods in the area of artificial intelligence called 'deep learning' and *natural language processing*, the researchers have taught a computer to identify which views on vaccines were expressed in a given tweet.

In doing so, they identified the users who consistently expressed strong views in favor of (provaxx) or against vaccines (antivaxx) and from which sources the profiles shared their vaccine information. Their work shows that 22.5 per cent of antivaxx-profiles' vaccine tweets link to YouTube videos.

The researchers then grouped the sources into five categories: Sites known for sharing pseudoscience and conspiracy theories, news sites, social media, YouTube (which was given its own category due to a large number of links), and finally, commercial sites relating to medicine and health.

The research confirms the echo chamber effect, making it hard for vaccine advocates and opponents to encounter each other's views on the internet—because social media algorithms ensure that people interact with others whose opinions align with their own.

"In fact, we discovered that the sources of...
information, which people are exposed to in their social networks, depend heavily on their own attitudes towards vaccines. The more resistance to vaccines a user expressed, the further from the norm was the media picture they were exposed to from their circle of friends," says Bjarke Mønsted.

**Combating misinformation is a joint responsibility**

Suppose the health authorities want greater support for vaccines. In that case, the responsibility lies not just with the tech giants but also with media outlets when it comes to avoiding medical misinformation, says Bjarke Mønsted.

"Research clearly shows that combating misinformation is a joint responsibility. It is important that media outlets do not create a false balance between views giving equal, or maybe even more, airtime to anti-vaccine arguments that are not substantiated by the scientific literature. Media should not portray medical information and misinformation as equivalent views," says Bjarke Mønsted.

Professor Sune Lehmann hopes that the novel method, which he and Bjarke Mønsted have developed and used to analyze the many billions of tweets, can provide a greater understanding of the vaccine discussion during the pandemic and in the future:

"Our research covers the period before COVID-19. And there is no doubt that vaccines have become a talking point in a whole new way in the last two years. It has gained a lot of attending and been overturned in a completely new way in the last two years. Vaccines have gone from being a topic that was primarily discussed among particular population groups to becoming a markedly more mainstream topic. Therefore, the exciting challenge going forward will be to use our methodological innovations to understand whether—and how—this shift has changed the discussion and the various actors’ motives."

**Facts**

- The data set contains some 60 billion tweets from 2013–2016.
- Vaccine supporters (provaxx) make up 45 per cent of the data. Vaccine opponents (antivaxx) make up 3 per cent of data.
- Using newly developed methods in the area of artificial intelligence called' deep learning' and 'natural language processing', the researchers have taught a computer to identify which views on vaccines were expressed in a given tweet.
- Their computer program followed links in tweets written by pro- and anti-vaxxers to locate the sites to which the links were pointing.
- Using the online service Media bias/fact check, the researchers have grouped the sources into five categories and identified sites known to share pseudoscience and conspiracy theories. This showed that anti-vaccine profiles more often share information from sites that sell alternative health products.
- When looking at the 10 sites from which are most frequently shared by pro- and antivaxx-profiles, 22.5 per cent of antivaxx-profiles’ tweets link to YouTube videos.


Provided by Technical University of Denmark