A PRELIMINARY EXPLORATION OF THE PREVALENCE OF AUTOMATED SOFTWARE PROGRAMMES AND SOCIAL BOTS IN THE COVID-19 #ANTIVAXX DISCOURSE ON TWITTER
ANTONIA EGLI (DCU), THEO LYNN (DCU), PIERANGELO ROSATI (DCU), GARY SINCLAIR (DCU)

BAD ROBOT
About Antonia Egli

• Postgraduate Researcher, Irish Institute of Digital Business at Dublin City University

• Research focus on identity, legitimacy and the spread and influence of fake news within online subcultures, specifically vaccination deniers on social media

• MSc in Digital Business
VACCINE HESITANCY CONTRIBUTES TO 1.5 MILLION AVOIDABLE DEATHS PER ANNUM [1]
THAT WAS BEFORE COVID-19
Vaccine hesitancy lies on a continuum from vaccine acceptance to vaccine denial and is influenced by a variety of factors.
We’re not just fighting an epidemic; we’re fighting an infodemic.

Tedros Adhanom Ghebreyesus
Director-General of the World Health Organization
[2]
The anti-vaxx movement comprises vaccine deniers or individuals who fully oppose vaccinations and has contributed to numerous disease outbreaks [4-6].

1970
DTP
Opposition to Diphtheria, Tetanus, and Pertussis and formation of The Association of Parents of Vaccine Damaged Children (APVDC) with medical endorsement.

1990s
MMR
Driven by fraudulent medical research and media confusion, MMR vaccines were linked to autism.

1800s
Smallpox
Anti-vaccination protests including celebrity endorsements and formation of Anti-Vaccination Leagues

2018
Green our Vaccines
Concerns over Thermisol, a preservative has resulted in concerns over autism driven by celebrity endorsed campaigns-Generation Rescue, and the organization Talk about Curing Autism (TACA).

2020
COVID-19
Misinformation on COVID-19 vaccines reinforced by senior political leaders and celebrities and COVID-19 specific movements.
The WHO is tracking over 30 discrete topics in its COVID-19 mythbusters website alone [12].
The Centre for Countering Digital Hate (CCDH) estimates over 59.2m people follow anti-vaxx social media accounts growing by at least 7.8m since 2018.

Anti-vaxx Positions:

- Questioning the safety and effectiveness of vaccines
- Sharing conspiracy theories online
- Publishing general misinformation and rumours
- Promoting that big pharma and scientific experts are not to be trusted
- Stating the civil liberties and humans’ freedom of choice are endangered
- Questioning whether vaccinated individuals spread diseases
- Promoting alternative medicine
Social media manipulation and deception make use of a wide range of sophisticated tactics [8]-[11].
THE ANTI-VACCINATION MOVEMENT HAS USED THESE TACTICS TO INFLUENCE VACCINATION NARRATIVES AND DECISION-MAKING PROCESSES [13].
What we wanted to know…

01

To what degree are automated software programmes used in the #antivaxx discourse on Twitter?

02

Does automated software usage differ between highly visible and highly active Twitter accounts in the #antivaxx discourse on Twitter?

03

How effective is Twitter at moderating content that is potentially harmful to the public?
Why Twitter?

- Large Monthly Active User Base
- Open Social Network
- Mostly Text-Based
- Short Messaging
- Hashtags
- Data Availability
- Widely Used by Health Professionals
- Widely Used For Health Information Discovery
The data is historic raw Twitter data gathered from December 2020
Only English language tweets featuring the #antivaxx hashtag were included.

<table>
<thead>
<tr>
<th>Metric</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Distinct Users</td>
<td>7721</td>
<td></td>
</tr>
<tr>
<td>Total Tweets</td>
<td>8949</td>
<td>100%</td>
</tr>
<tr>
<td>No. of Original Tweets</td>
<td>2301</td>
<td>25.71%</td>
</tr>
<tr>
<td>No. of Replies</td>
<td>336</td>
<td>3.74%</td>
</tr>
<tr>
<td>No. of Retweets</td>
<td>6312</td>
<td>70.53%</td>
</tr>
<tr>
<td>No. of Tweets with URLs</td>
<td>1680</td>
<td>18.77%</td>
</tr>
<tr>
<td>Avg. Tweets per User</td>
<td>0.3</td>
<td></td>
</tr>
</tbody>
</table>
To what degree are automated software programmes used in the #antivaxx discourse on Twitter?

Twitter generator metadata was extracted, including:

- Name of source application
- Link to source application

Approx. 45 generators (54% of all generators) self-identified as bots or exhibited bot behaviour.

Only 1%-2% of all users used automated software however these accounts generated 3.5%-5% of all tweets.
Does automated software usage differ between highly visible and highly active Twitter accounts in the #antivaxx discourse on Twitter?

The top 100 active users generate nearly 4x more original tweets than top 100 visible users.

21% of the top 100 active users were given a high or very high bot rating by IUNI Botometer compared to 6% of the top 100 visible users.

Bot behaviour was driven by (i) bot self declaration, (ii) echo chamber behaviour, and (iii) high fake follower counts.

<table>
<thead>
<tr>
<th>Bot Score</th>
<th>Active Users</th>
<th>Visible Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>High</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Medium</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Low</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Very Low</td>
<td>36</td>
<td>51</td>
</tr>
<tr>
<td>Suspended/No Longer Accessible</td>
<td>22</td>
<td>17</td>
</tr>
</tbody>
</table>

The IUNI Botometer leverages over 1,000 features from a Twitter account and its activity including astroturfing, spamming, bot self-declaration, fake follower count etc.
How effective is Twitter at moderating content that is potentially harmful to the public?

Automated software does not equate to true #antivaxx supporters. Only one of the high probability bot users was a true #antivaxx supporter.

Analysis of the suspended accounts in the top 100 suggested higher proportions of suspended accounts were true #antivaxx supporters (9/39 suspended accounts).
False information can result in individual citizens becoming vaccine hesitant or vaccine deniers.

Countering the anti-vaccination movement is a significant multi-stakeholder challenge requiring active intervention.

There is evidence that the pro-vaccination community and platforms were effective in the initial COVID-19 #antivaxx discourse. Further research on the wider discourse is required.

Understanding the different mechanisms being used by anti-vaccination promoters can mitigate the adverse effects of the anti-vaxx movement and restore faith in vaccines and vaccinations.
THANK YOU
References


References
