PA Vaccine Conversations and Misinformation on Twitter
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Vaccine Hesitancy Project Update based on May 21, 2021
The CMU centers for:
Informed DEmocracy And Social cyber-security
Computational Analysis of Social and Organizational Systems

This report is an effort to summarize social media conversations around COVID-19 issues in Pennsylvania, focusing on vaccination. It contains an analysis of the general topics about the current pandemic, such as COVID-19 regulations, mandates, masks, pro-and anti-vaccination campaigns, as well as other topics related to COVID-19 misinformation, disinformation, conspiracy theories, and vaccine hesitancy messages.

The material contained in this report is a summary of social media content and does not represent a judgment or characterization of any individual.
High Level View May 13 – May 19, 2021
Old Discussions Continuing

<table>
<thead>
<tr>
<th></th>
<th>Total PA</th>
<th>Philadelphia</th>
<th>Pittsburgh</th>
<th>Erie</th>
<th>Allentown/Bethlehem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversation</td>
<td>Tweets</td>
<td>Tweets</td>
<td>%</td>
<td>Tweets</td>
<td>%</td>
</tr>
<tr>
<td>Overall Vaccine</td>
<td>135,294</td>
<td>75,737</td>
<td>56%</td>
<td>32,081</td>
<td>24%</td>
</tr>
<tr>
<td>Vaccine Passports</td>
<td>1,134</td>
<td>480</td>
<td>42%</td>
<td>383</td>
<td>34%</td>
</tr>
<tr>
<td>Misinfo: &quot;Mark of the Beast&quot;</td>
<td>21</td>
<td>12</td>
<td>57%</td>
<td>6</td>
<td>29%</td>
</tr>
<tr>
<td>Fake Vaccine Cards</td>
<td>30</td>
<td>17</td>
<td>57%</td>
<td>3</td>
<td>10%</td>
</tr>
<tr>
<td>Not FDA approved</td>
<td>58</td>
<td>33</td>
<td>57%</td>
<td>20</td>
<td>34%</td>
</tr>
<tr>
<td>Boosters</td>
<td>48</td>
<td>27</td>
<td>56%</td>
<td>9</td>
<td>19%</td>
</tr>
<tr>
<td>Misinfo: Microchips</td>
<td>116</td>
<td>61</td>
<td>53%</td>
<td>36</td>
<td>31%</td>
</tr>
<tr>
<td>Misinfo: Shedding</td>
<td>59</td>
<td>39</td>
<td>66%</td>
<td>8</td>
<td>14%</td>
</tr>
<tr>
<td>&quot;Experimental&quot;</td>
<td>430</td>
<td>219</td>
<td>51%</td>
<td>92</td>
<td>21%</td>
</tr>
<tr>
<td>Children</td>
<td>1,420</td>
<td>769</td>
<td>54%</td>
<td>348</td>
<td>25%</td>
</tr>
<tr>
<td>Masks</td>
<td>10,696</td>
<td>6,502</td>
<td>61%</td>
<td>2,349</td>
<td>22%</td>
</tr>
<tr>
<td>Infertility</td>
<td>39</td>
<td>33</td>
<td>85%</td>
<td>5</td>
<td>13%</td>
</tr>
</tbody>
</table>

Vaccine Narrative Descriptions (Newer)

- Infertility: mix of questioning and sharing idea that the vaccines cause infertility
Some Observations

- Continuing the trend, higher population areas typical also have higher amounts of Twitter discussion about any given subject.

- Several stories vanished from the discourse ("Luciferase", "Celebrity deaths", menstrual issues, "if you already have the vaccine" all with less than 10 total tweets).

- "Shedding" narrative that was more prominent last week has returned to a lower level. "Experimental" and "microchip" narratives have stayed steady.

- Discussion of vaccines and masks jumped, most likely due to CDC announcement.

Ongoing work

- Adding data on Tweets from rural/other PA locations.
- Separating out more clearly the pro-misinformation and anti-misinformation discussions and which narratives occur together in time.
- Looking more closely at proponents of misinformation that are targeting officials/health agencies – so far, while we have seen this activity the amount of attention it has generated on Twitter has been minimal.
**Process Description**

- To get a broad sense of the Twitter conversation about vaccines and vaccine misinformation we have collected tweets based on a combination of keyword-based and location-based methods.

- Locations are assigned to tweets based on a mix of the following: Twitter's own location-based search operations, Twitter's annotations, and our own machine-learning based tool.

- We are focused on the 5 following locations:
  - 4 larger city areas: Philadelphia, Pittsburgh, Allentown/Bethlehem, Erie
  - 1 area comprised of as much of the rest of PA as is possible (rural areas plus other smaller urban areas) – this is not currently shown in these slides

**Types of Discussions**

- It is helpful to be aware that Twitter conversations around vaccines and vaccine misinformation may contain a variety of types of discussions:
  - Pro-vaccine news and information
  - Honest questions/concerns about vaccines
  - Informative responses to questions
  - Misinformation and disinformation about vaccines
  - Informative responses to misinformation/fact-checking
  - Pro-vaccine satire/sarcasm/personal attacks against proponents of anti-vaccine views
  - Anti-vaccine satire/sarcasm/personal attacks against proponents of pro-vaccine views/government and medical professionals
Vaccine Narrative Descriptions (Older)

- Overall Vaccine Conversation: tweets that mention any of a set of vaccine keywords
- Vaccine Passports: mix of discussions mentioning vaccine passports
  - Misinfo: “Mark of the Beast” – religiously-tinged conspiracy theory that vaccines and vaccine passports represent the mark of the Devil from an interpretation of Christian end times scripture
  - Mixed: Non-Religious Government control narratives – mix of questioning and outright conspiracy
  - Fake vaccine cards – discussions of creating fake IDs (both pro and anti-making the IDs)
- Vaccine Ingredients
  - Misinfo: Luciferase - religious-tinged conspiracy that the compound is of the Devil (Luciferase is a real compound related to bioluminescence), mix of misinformation and those scorning the misinformation
  - Misinfo: Microchips – conspiracy theory that microchips for population control are in the vaccines, Twitter conversation is mix of sharing conspiracy and sharing scorn for it
- Vaccine Side effects
  - Mixed: Menstrual ghost effects/shedding – questioning and/or passing of misinformation about vaccine’s ability to “hop” from person to person affecting menstrual patterns
  - Mixed: Herpes – questioning and/or passing of misinformation that vaccines cause herpes
  - Misinfo: Celebrity deaths – discussions blaming the death of DMX and Prince Phillip on them getting COVID vaccines

Vaccine Narrative Descriptions (older cont.)

- Need for vaccine
  - Misinfo: “if you have already had the disease” then you don’t need the vaccine – mix of questioning and misinformation

- Vaccine administration
  - Not FDA approved – discussion/misinformation about emergency use authorization
  - Boosters – news and discussion of whether boosters are just a cash grab

- Johnson and Johnson fallout – discussions of the pause in use of J&J vaccine in US, mix of questioning, news discussion, and misinformation related to vaccine safety/confounding all three vaccines in the US
Vaccine Narrative Descriptions (older cont.)

- Experimental: mix of discussions, mostly misinformation or correcting misinformation that COVID vaccines are entirely experimental

- Children: mix of discussions about announcement to allow use of more vaccines for teenagers, mix of news, pro-content, anti-content, and misinformation

- Masks: mix of discussions about vaccines and masks

For More Information

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- IDeaS website - https://www.cmu.edu/ideas-social-cybersecurity/
- CASOS website – http://www.casos.cs.cmu.edu/