The many strains of anti-vaxxers: a study of COVID-19 anti-vaccination Tweets

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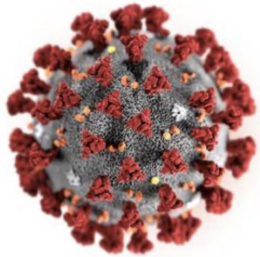
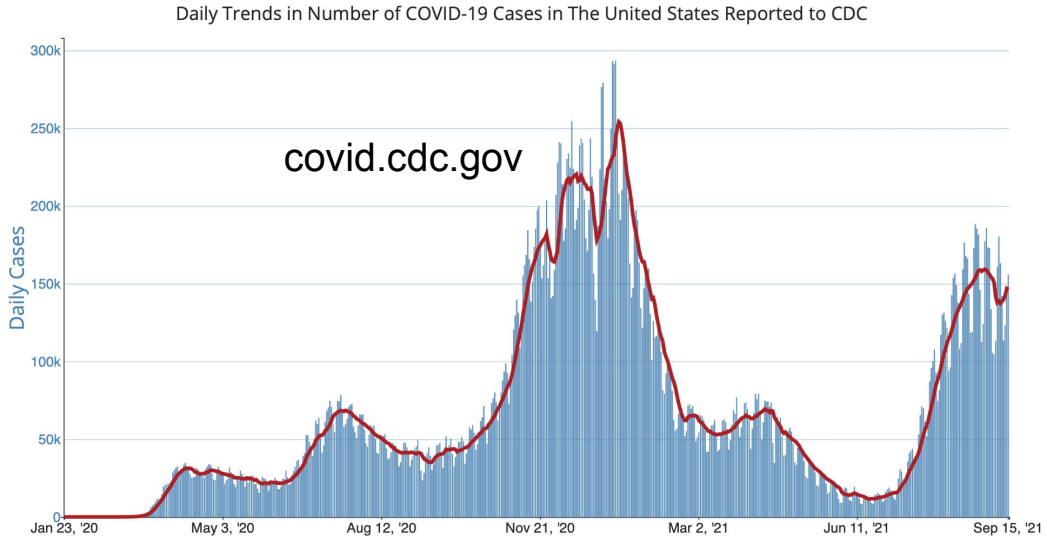
September 17th, 2021

The Problem



- COVID-19 delta variant continues to surge in the US
- Primarily affecting the unvaccinated
    - Approx 25% of adults

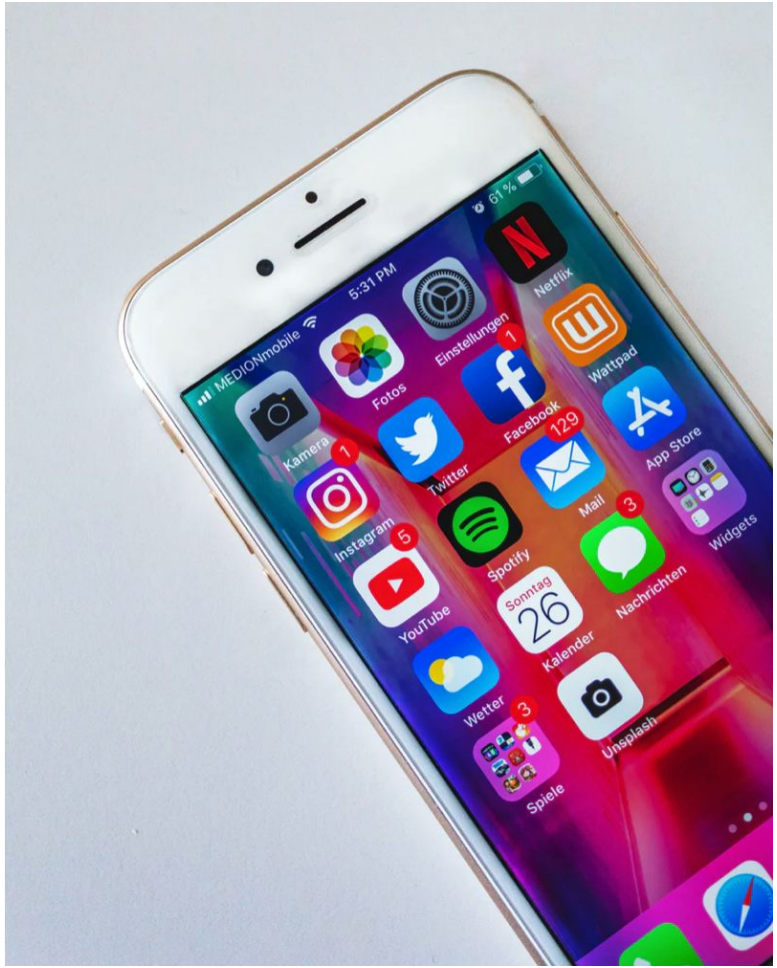


The Problem

- Social media platforms are known spreaders of anti-vaccine misinformation
  - Can fuel vaccine hesitancy
- Project aims:

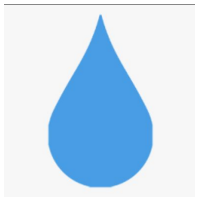
  1) Identify sub-topics within COVID-19 anti-vaccine movements

  2) Learn how sub-topic popularity has changed over time



Data & Methods

1.8 million TweetIDs
- Original Tweets collected in real time by study authors*
- Queried Twitter with 59 anti-vaccine keywords
  - Ex: “vaccineskill”
- Nov 2020 - Apr 2021



Hydrator App

1.7 million TweetIDs
- Lost 700K Tweets (lkely deleted by Twitter)

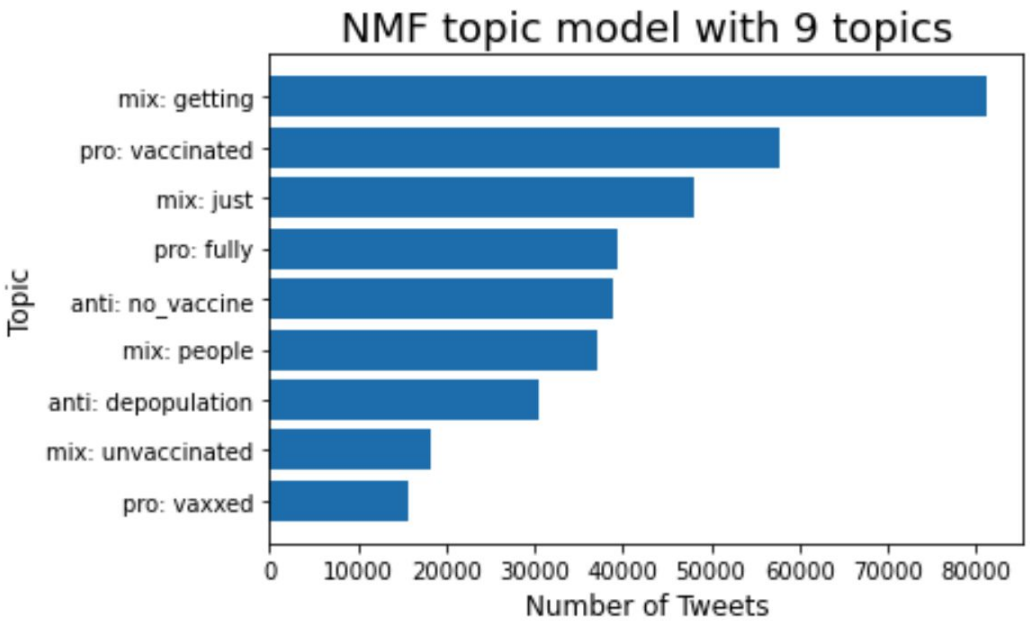
367 K unique Tweets

*Muric G, Wu Y, Ferrara E. COVID-19 Vaccine Hesitancy on Social Media: Building a Public Twitter Dataset of Anti-vaccine Content, Vaccine Misinformation and Conspiracies, arXiv:2105.05134 [cs.SI] 2021

Text pre-processing & modeling

- Preprocessing - primarily with sklearn and regex
  - Removed links and @mentions
  - Kept #hashtag text, but removed the ‘#’

- Topic modeling with NMF
  - 9 topics



9 topics

3 subtopics (based on my review of the top words):

- anti-vaccine
- pro-vaccine
- mix of both

- although data collection was designed to catch anti-vax, some pro or neutral tweets made it through

2 strongly anti-vaccine topics

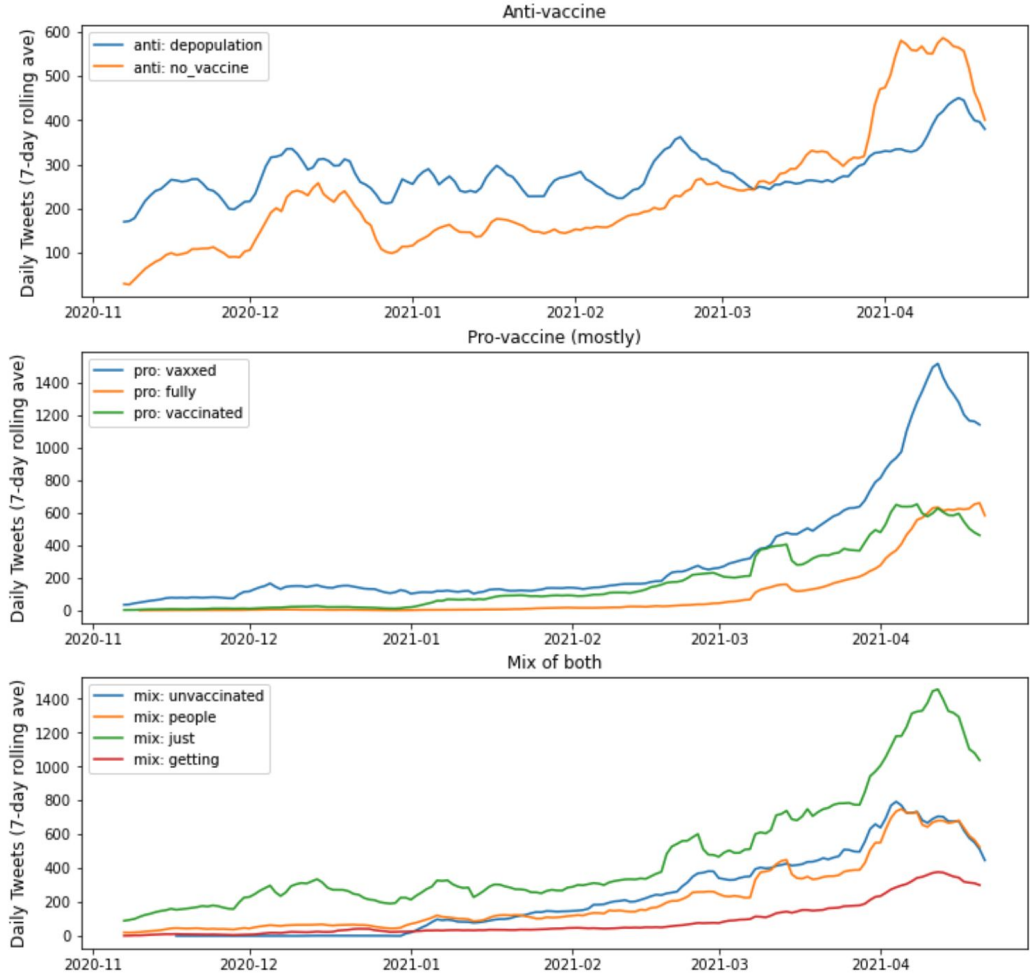
Depopulation/Bill Gates world agenda:

- Bill Gates is one of the biggest proponents of mass depopulation.
- It’s not about healing it’s about depopulation. 🤡💉
- @melindagates @BillGates After creating a virus, its easy with depopulation.

Misc ‘no vaccine’:

- What is in this vaccine 😱
- @OANN Every Vaccine Causes Harm\n#LearnTheRisk
- WOW, HEP B Vaccine link to MS
- That's what you'd find on my "vaccine card". #IWillNotComply

Daily tweets per Topic (November 2020 - April 2021)



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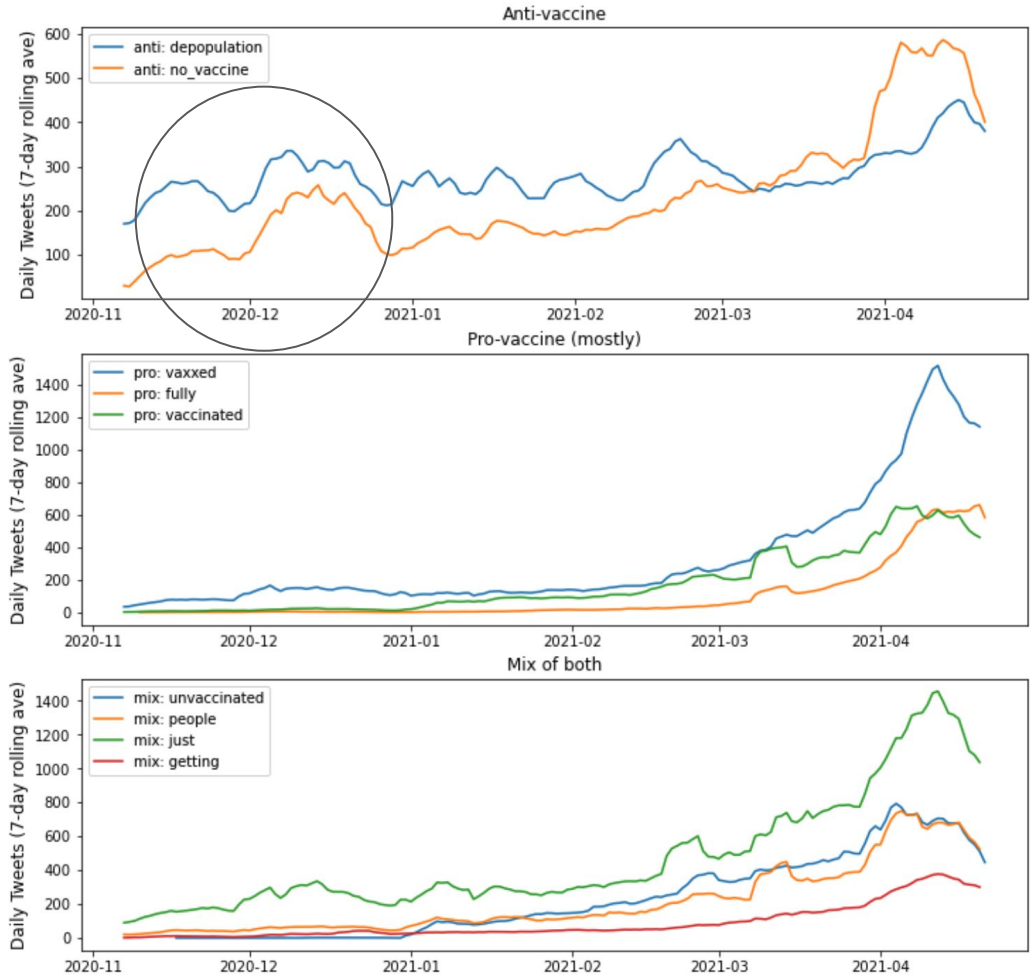

Conclusion

1) Identified sub-topics within COVID-19 anti-vaccine movements: particularly depopulation theory

2) Learned anti-vax messaging started early!

Try to avoid making the same mistakes next time

Future Directions

- Try converting emojis to text
- Try to add a supervised component using anti-vaccine vs pro/neutral keywords
- Explore location data

Thank you!