

# COVID-19 Non Pharmaceutical Interventions: Analysis at the County Level

Student: Anjali Mathew  
Mentor: Ben Hurt

## Background

Non-Pharmaceutical Interventions (NPIs) were enacted by state and local governments to limit the spread of COVID-19

- Most widely used in the early stages of the virus, before there was substantial research or vaccines available.

## Data Collection & Validation

### Collection

- Searching social media, county websites, news articles
- Mandates sorted into the following categories:
  - school closures
  - mask mandates
  - business closures
  - religious closures
  - lockdowns
- Challenges: encapsulating nuances of NPIs with tags, knowing when to stop searching

### Validation

- Correctness: verifying that the source corroborates the database information
- Completeness: conducting a secondary search to ensure there are no conflicts

## Project Goals

- Formalizing a process for collecting and validating data on NPIs in Virginia counties to inform future pandemics.
- Understanding what aspects of this process could be automated

Current Goal: Understanding the scope and effectiveness of non-pharmaceutical interventions

- Using data analysis software (Pandas) to visualize NPI data
- Understanding can help with possible future pandemic response
- Summarizing thoughts in a formal paper

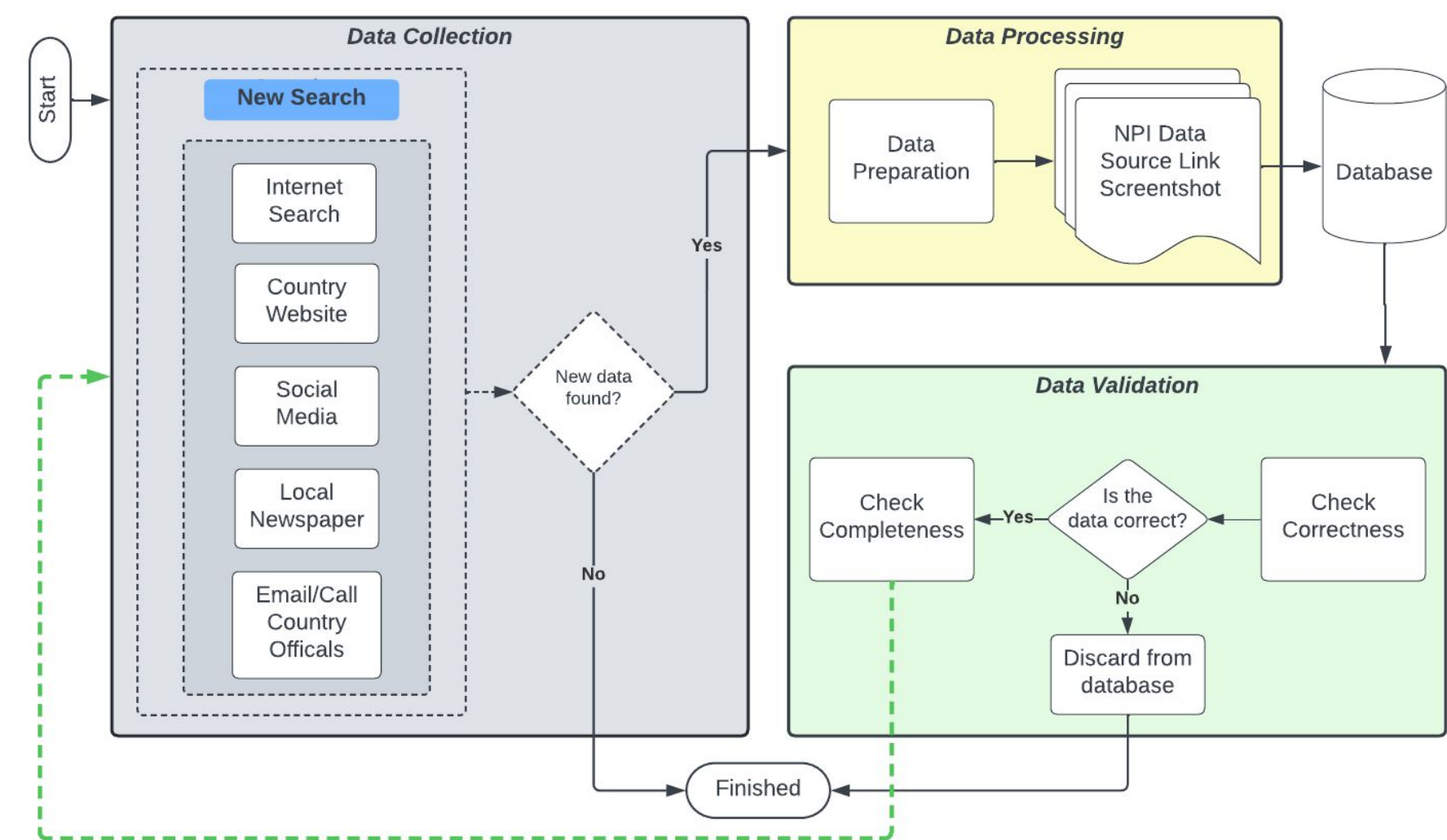


Figure #1. Algorithm used for collecting, processing, and validating data

## Visualizations and Analysis

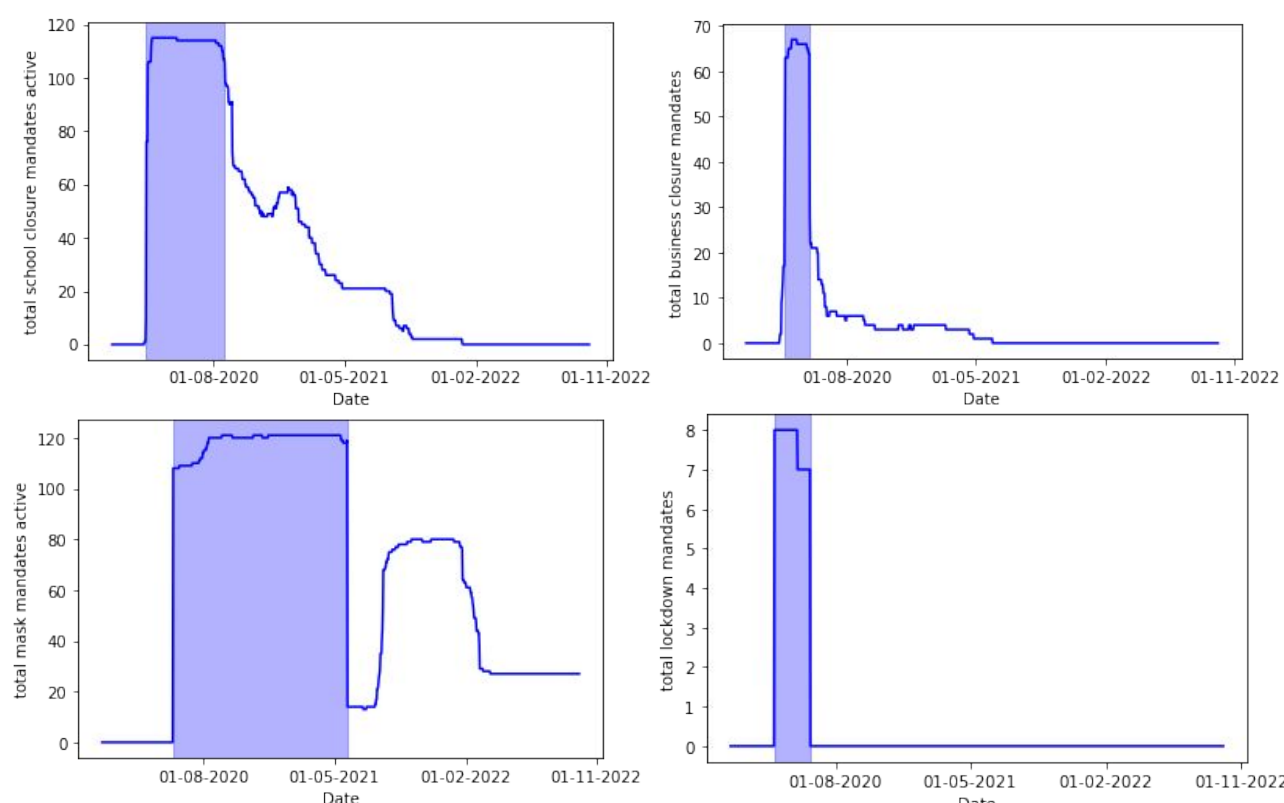


Figure #3. Comparing the duration of county-level and state-level mandates in VA

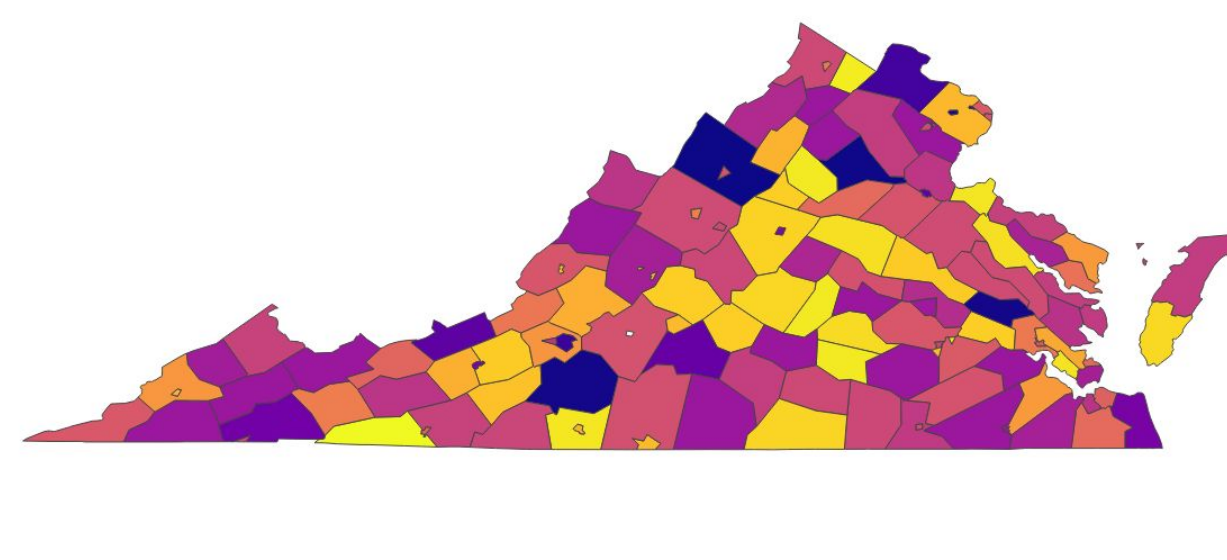


Figure #4. Correlation by county between NPIs and cases through March-June 2020

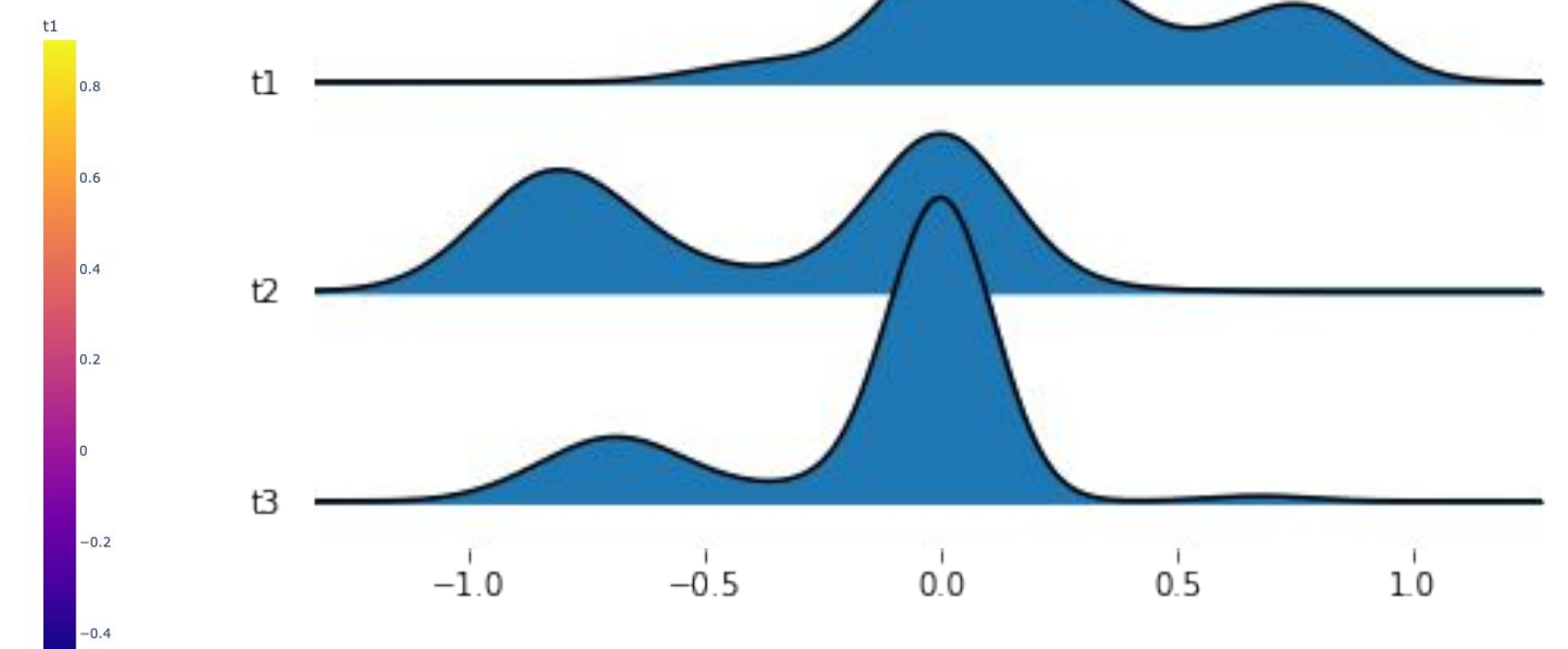


Figure #5. Overall distribution of county correlations for all three timeframes

## Steps

- Created a time series of active NPI mandates from the database, overlaid with a 7-day rolling average of COVID case data
- Search on each specific type of mandate, overlaid with the state mandates to observe how the county level mandates interacted with the state level mandates.
- Created a choropleth map using plotly. Takes in FIPs data and a GeoJSON file as parameters and displays a county-level breakdown of any metric. Chose to observe correlations between NPIs and cases, with the assumption that a negative correlation would suggest a more effective NPI.

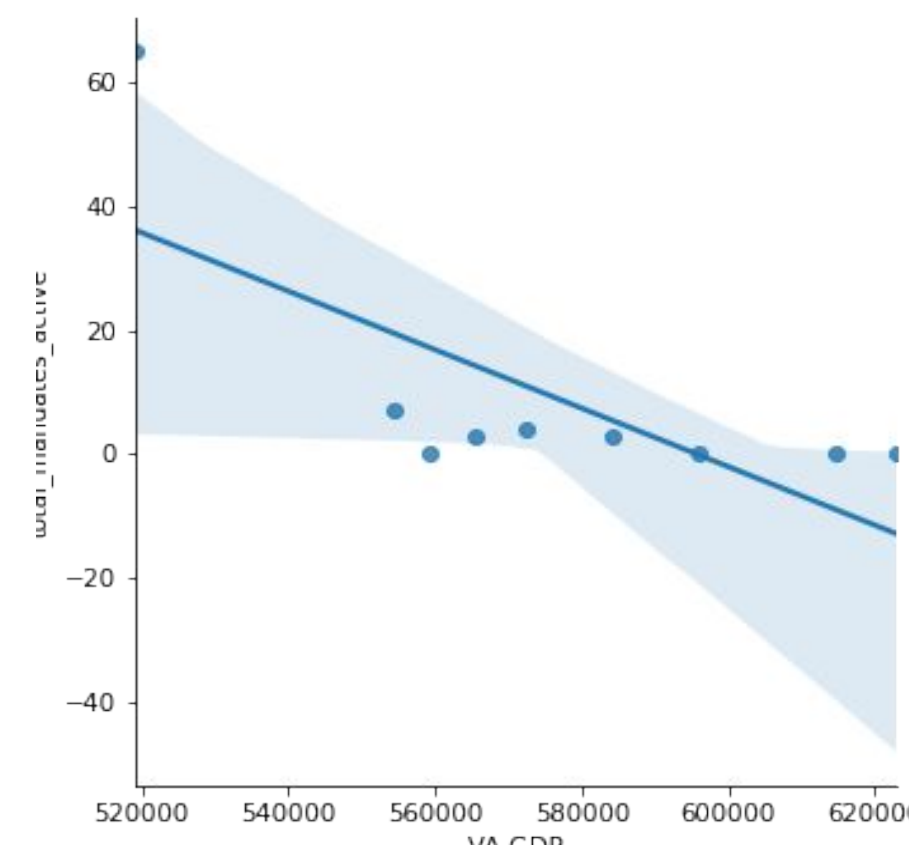
## Results

- Large scale data in VA counties suggests NPIs were inversely correlated with cases, but confounding variables prevent concrete conclusions from being drawn without observing the data in more detail, breaking it down by type or region
- County level mandates were often stricter than the state level ones, extending them further out
- Mask mandates and school shutdowns extended the longest; counties took the most initiative here.
- As time went on, the NPIs had less and less effect on cases, as more counties were recorded with near 0 correlation between NPIs and cases

## Citations

- Ackerman, Daniel. "Data Visualizations: When More COVID-19 Data Doesn't Equal More Understanding." SciTechDaily, 31 Dec. 2021, <https://scitechdaily.com/data-visualizations-when-more-covid-19-data-doesnt-equal-more-understanding/>.
- Brauner, Jan M. "Inferring the Effectiveness of Government Interventions against COVID-19." Science, Science, 15 Dec. 2020, <https://www.science.org/doi/10.1126/science.abd9338>.
- Moraes, Rodrigo Fracalossi de, et al. "Effects of Non-Pharmaceutical Interventions on Social Distancing during the COVID-19 Pandemic: Evidence from the 27 Brazilian States." PLOS ONE, Public Library of Science, 17 Mar. 2022, <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0265346>.

## Future Work



## Economic Effects of NPIs

- looking further into business mandates specifically and the effects they had on the local economy
- Possibly using mobility data due to a shortage of economic data available