The Future of Parks within the U.S.: Covid-19 Vaccinations vs. Park Visitation

W203: Lab 2 - Summer 2021
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Berkeley SCHOOL OF INFORMATION

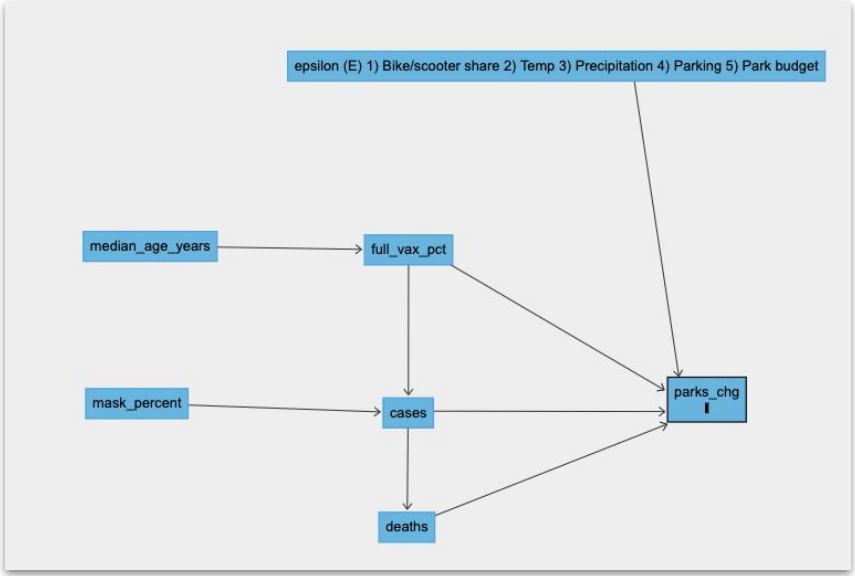
Agenda

- Research Question and Theoretical Model
- Data and Variables of Interest
- Statistical Models
- Model Limitations
- Omitted Variables
- Results

Research Question and Causal Model

Question: How do Covid-19 vaccination rates within a county impact visits to parks within that county?

Causal Theory: Counties with high vaccination rates are returning to pre-pandemic activities faster, and are not likely to continue use of public parks as seen during the pandemic.



Data & Variables of Interest

Target Variable: Percent change in park visits from baseline

- The baseline is the median value, for the corresponding day of the week, during the 5-week period Jan 3–Feb 6, 2020.
  - *Google Maps COVID-19 Community Mobility Report*

X Variable(s):

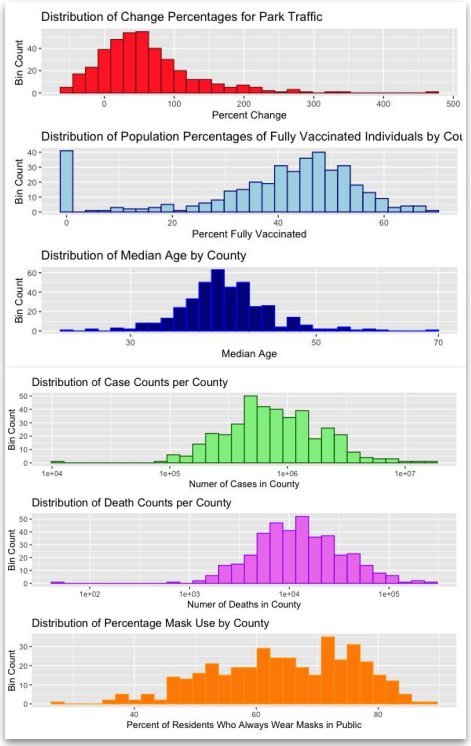
1. Percent of people who are fully vaccinated based on the county where recipient lives
   - As of June 30, 2021
   - *CDC Data on Vaccination*
2. *Mask Usage*
3. *Age*
4. *Covid cases*
5. *Covid deaths*

Sources:

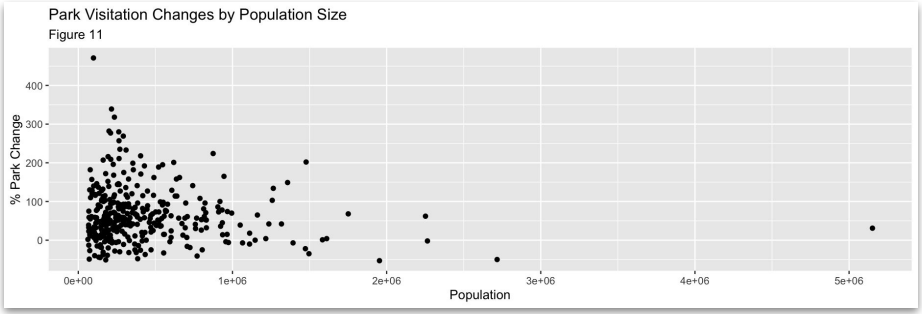
1. Google: Community Mobility Report
2. CDC: Vaccinations by county
3. Census.gov: Age by county
4. New York Times:
   a. Sentiment towards mask usage
   b. Covid cases
   c. Covid deaths

EDA

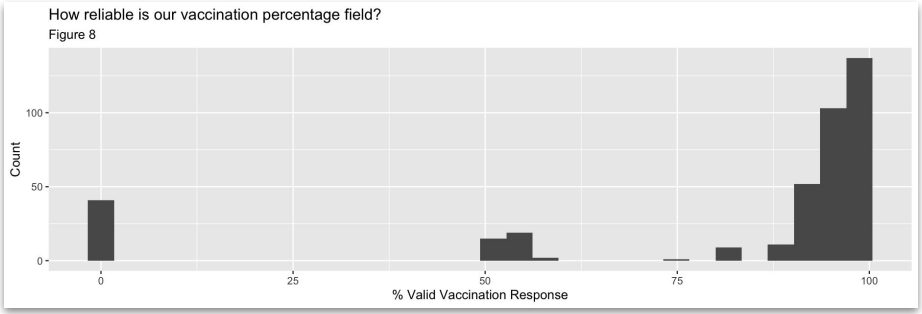
Distributions by Variable:



Change in Park Visits vs. Population Size



Data Errors:



Models

Model One

Percent Change Park Visits

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Percent of Population Fully Vaccinated

Model Two

Percent Change Park Visits

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Percent of Population Fully Vaccinated

Number of Cases *

Model Three

Percent Change Park Visits

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Percent of Population Fully Vaccinated

Count of Fully Vaccinated Individuals

Number of Cases *

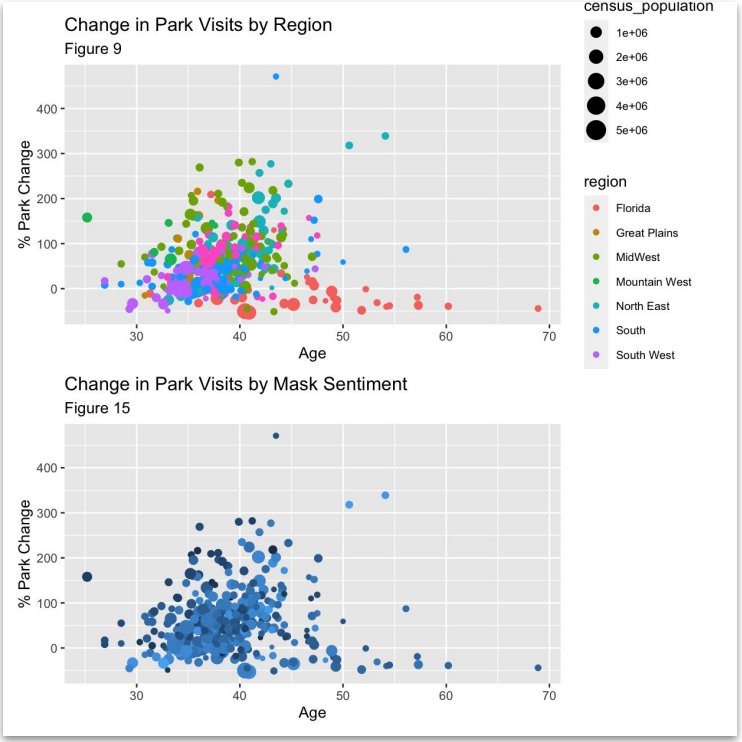
Percent of Population that Always Wears a Mask

Median Age in Years

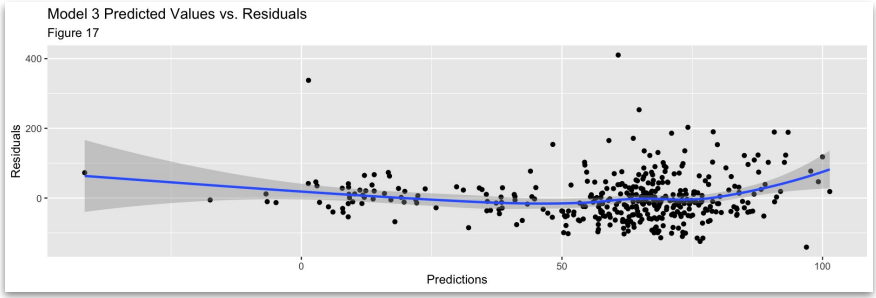
** A log transformation has been applied to this variable*

Model Limitations

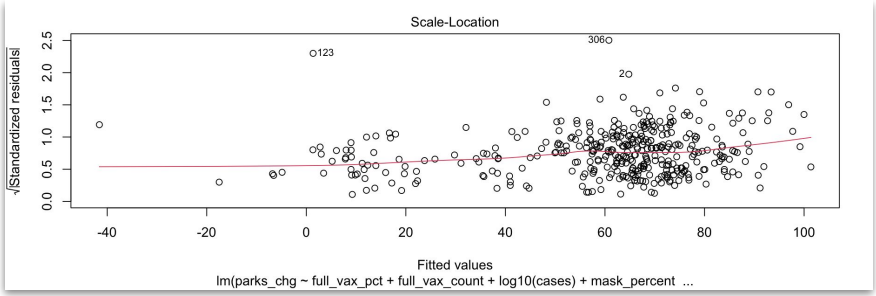
IID:



Linear Conditional Expectations:



Homoscedasticity:



Omitted Variables

Changes in variables from baseline date (Y: Parks_chg, X: Vax_pct,):

- Temperature (+ , n/a)
- Precipitation (- , n/a)
- Bike & scooter sharing stations proximity (+ , +)
- Parking spot availability (+, +)
- Maintenance of parks, total investment in parks in dollars (+, n/a)
- Square acres dedicated to parks (+, n/a)
- Percent of residents within a 10 minute walk (+, +)

Results

Table 1: The relationship between vaccination rates and park traffic

	Dependent variable:		
	parks_chg		
	(1)	(2)	(3)
full_vax_pct	1.095***	1.138***	1.439***
	(0.175)	(0.175)	(0.274)
full_vax_count			-0.0001
			(0.00003)
log10(cases)		-11.516	10.000
		(7.742)	(10.047)
mask_percent			-0.647
			(0.335)
median_age_years			-0.136
			(1.224)
Constant	17.176*	83.340	1.591
	(6.970)	(46.291)	(86.494)
Observations	390	390	390
R2	0.073	0.077	0.106
Adjusted R2	0.070	0.072	0.095
Residual Std. Error	66.584 (df = 388)	66.510 (df = 387)	65.706 (df = 384)
F Statistic	30.459*** (df = 1; 388)	16.201*** (df = 2; 387)	9.144*** (df = 5; 384)
Note:			*p<0.05; **p<0.01; ***p<0.001

- For every + 1% in vaccination percentage →
  - Results in + 1.095% in park visits - Model 1
  - Results in + 1.138% in park visits - Model 2
  - Results in + 1.439% in park visits - Model 3
- For every + 1 vaccinated citizen →
  - Results in - 0.0001% in park visits - Model 3
- For every + 1 in cases on a log scale →
  - Results in - 11.516% in park visits - Model 2
  - Results in + 10.00% in park visits - Model 3
- For every +1% of diligent mask wearers →
  - Results in - 0.647% in park visits - Model 3
- For every +1 years in median age →
  - Results in - 0.136% in park visits - Model 3

Conclusion

- Mostly a positive sign for park visitation in the future
- We can’t be certain about the true effect without a time-series study; the effect could be temporary
    - Uncertainty in controlling for IID
    - Important variables missing
    - Vaccinations might not continue to increase
    - Park visitation might be a temporary fad
- Future analysis:
    - Time-series study
    - Similar study once the pandemic has ended globally
    - Studies including more detailed data

Q&A