

# Using Large Social Data for COVID-19

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# Using Large Social Data for COVID

## [0] **Psychological impact** of COVID

## [1] Monitoring COVID **prevalence**

- Symptom tracking: (e.g., Google Flu trends)
- Finding new symptoms

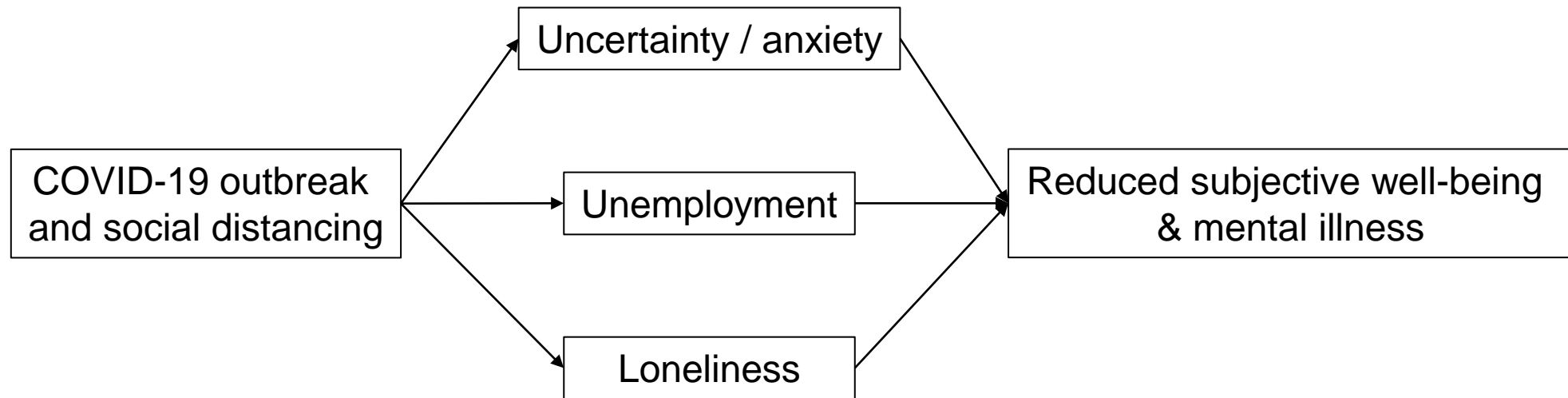
## [2] **Adherence**

- Adherence tracking with shelter-in-place orders (location data)

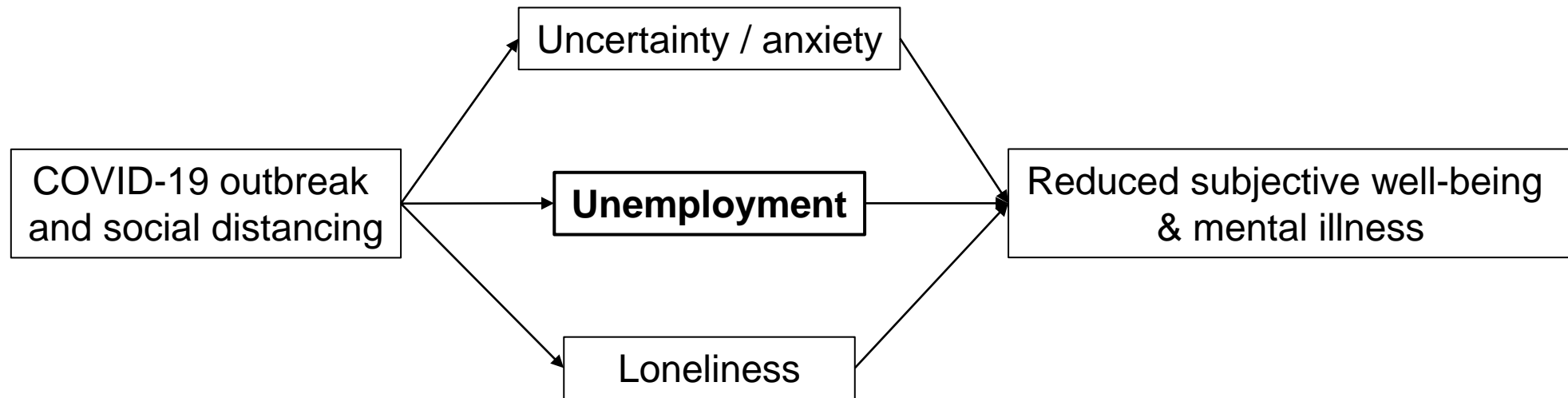
## [3] COVID-related **discourse**

- Prevalence of public health messages
- Tracking of Misinformation

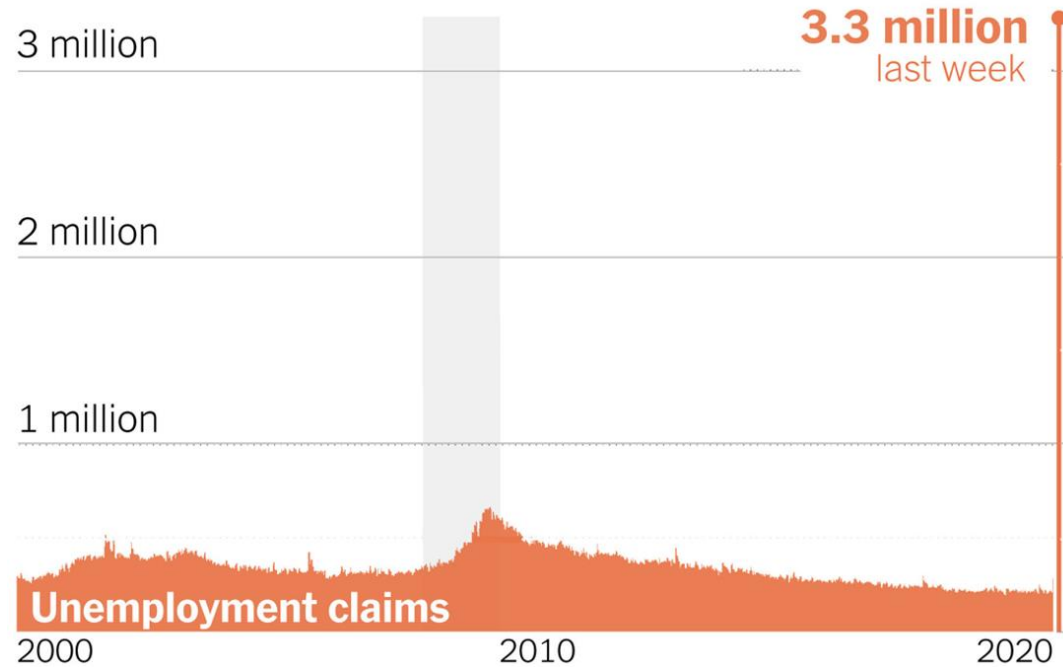
# The Psychological Impact of COVID-19



# The Psychological Impact of COVID-19



# Unemployment & Life Satisfaction

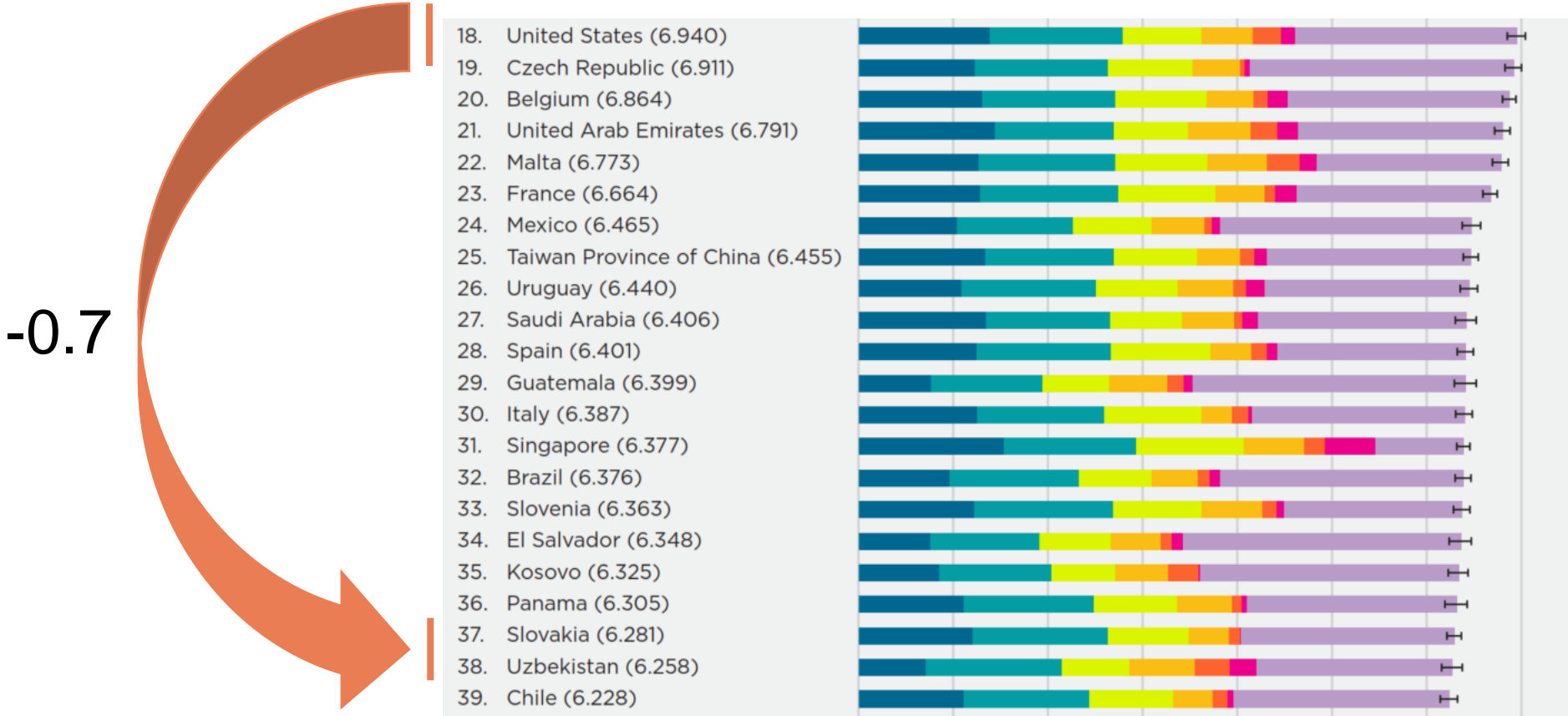


Bui & Wolfers, *New York Times* (2020-03-26)

Lucas, Clark, Georgellis & Diener (2004). *Psychological science*, 15(1), 8-13.



# Unemployment & Life Satisfaction



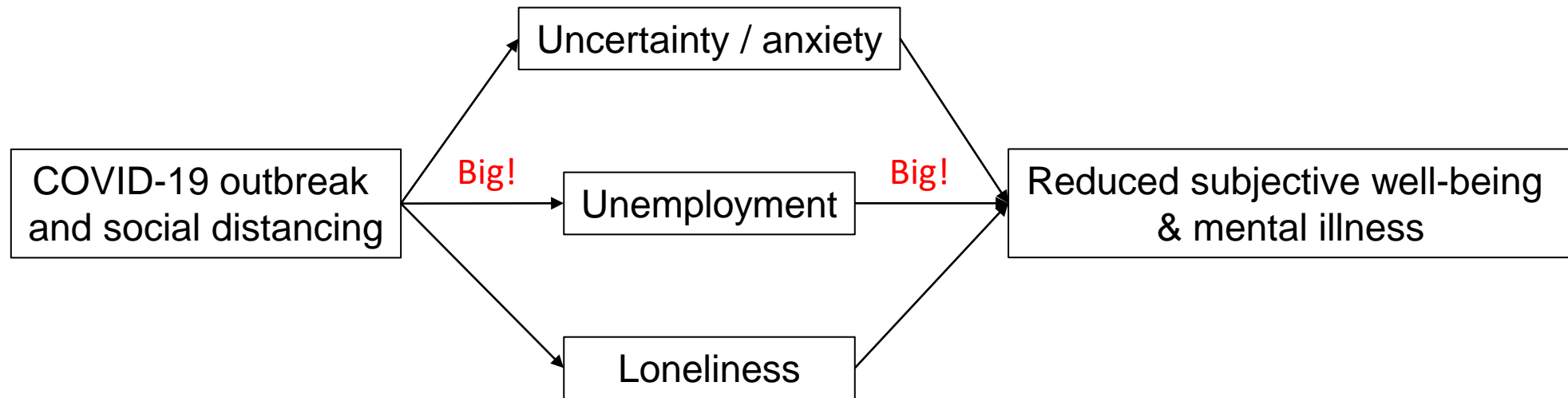
-0.7

That is big!

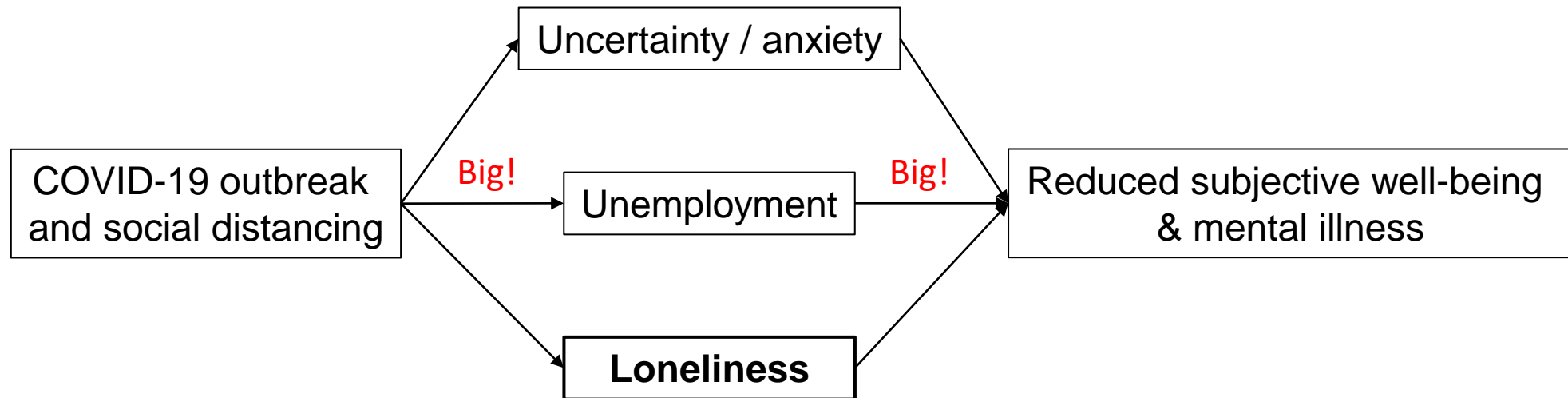
World Happiness Report, 2020



# The Psychological Impact of COVID-19



# The Psychological Impact of COVID-19





# Loneliness & Life Satisfaction

Impact: **-0.5**

Comparable to the impact of suffering from **headaches** or being **chronically** ill.

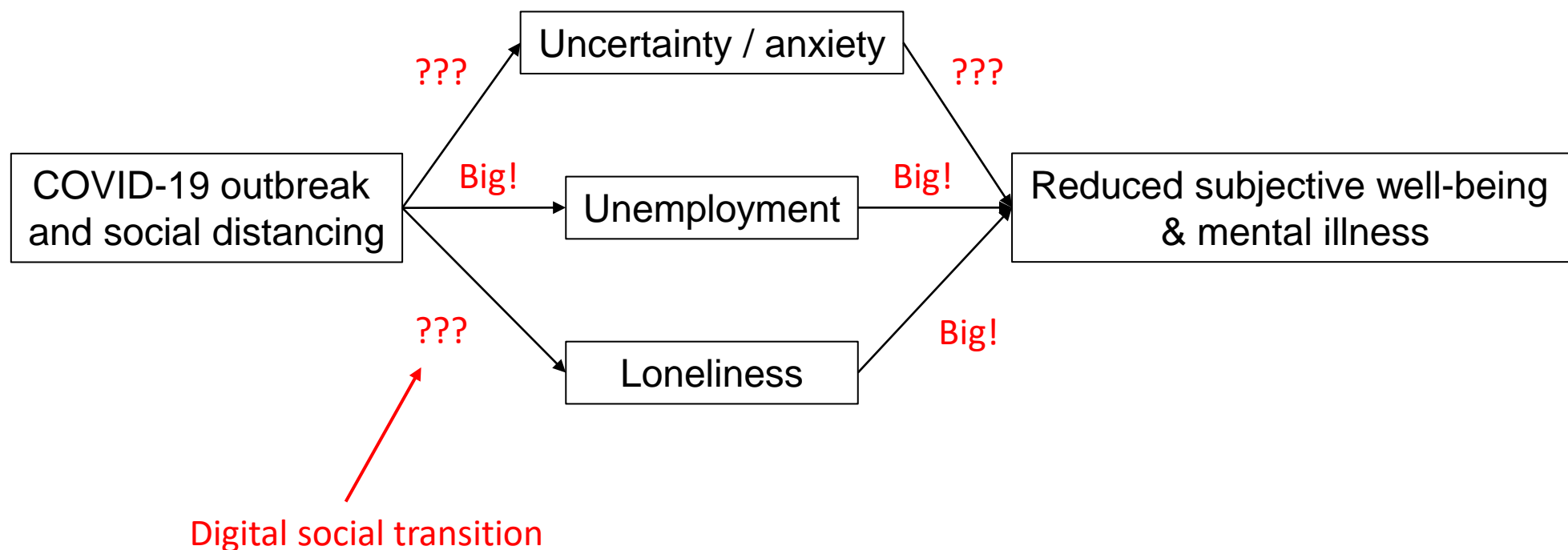
That is also big!

N= 700,000

Kahneman & Deaton (2010) *PNAS*



# The Psychological Impact of COVID-19



We need to measure the impact of COVID  
on well-being and mental health.

How?

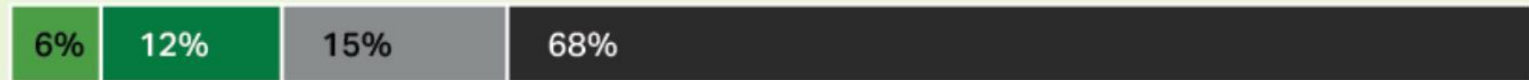
# National Measurement with surveys

## Expected Outcomes of Social Distancing Practices

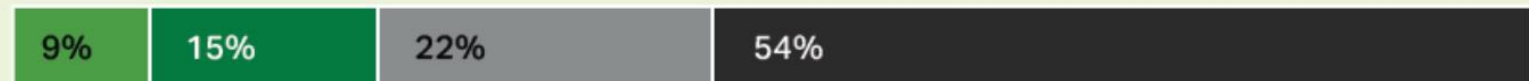
■ Already experiencing    ■ A few more weeks    ■ A few more months    ■ As long as is necessary

How long can you follow social distancing practices and business/school closures before ...

... your **physical health** suffers?



... experiencing **significant financial hardship**?



... your emotional or **mental health** suffers?



GALLUP PANEL, APRIL 6-12, 2020

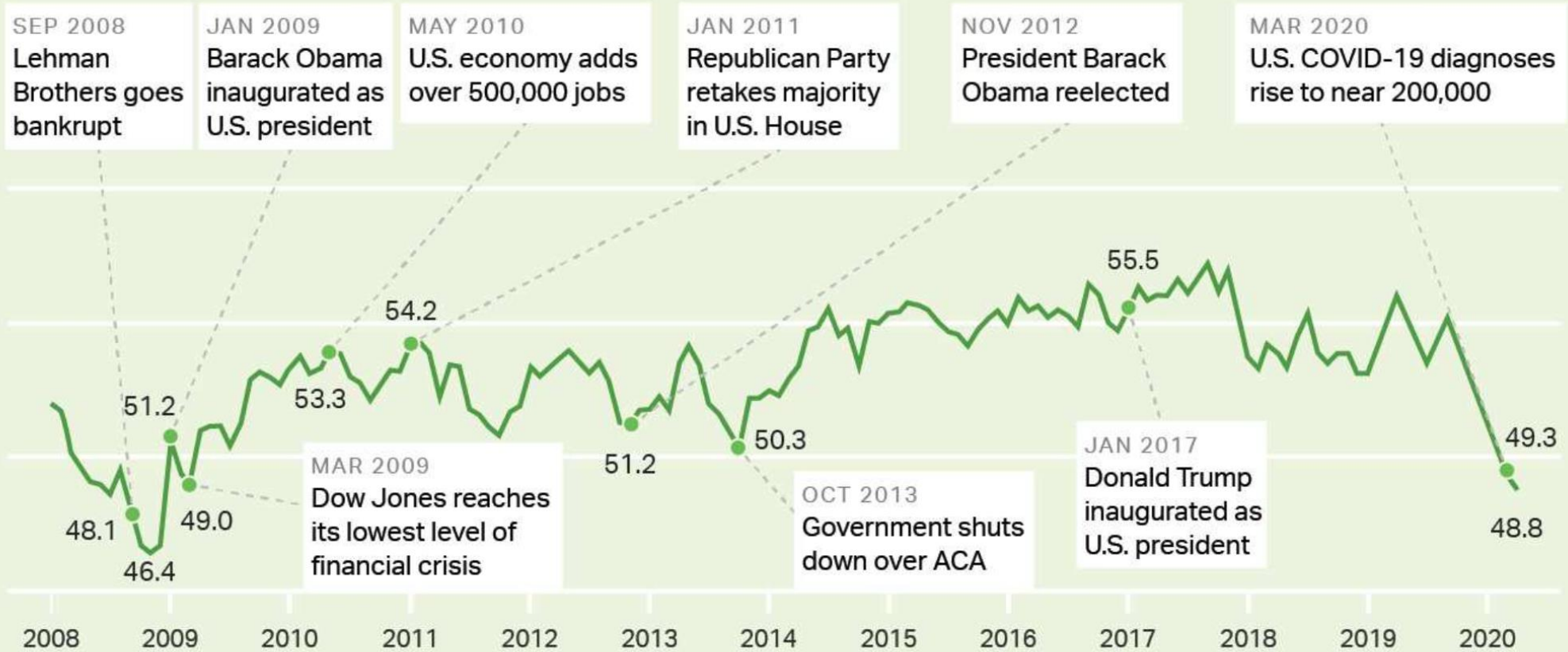


Source: <https://news.gallup.com/poll/308420/americans-say-covid-hurting-mental-health.aspx>

Johannes Eichstaedt, 4/16/2020. Stanford University.  
eichstaedt@stanford.edu

# Life Evaluations of U.S. Adults

■ % Thriving



Data from January 2008 to August 2019 are based on the Gallup National Health and Well-Being Index; data from Sept. 30-Oct. 14, 2019, and from March 6-20 and March 21-April 5, 2020, are from the Gallup Panel.

GALLUP, JANUARY 2008–APRIL 2020



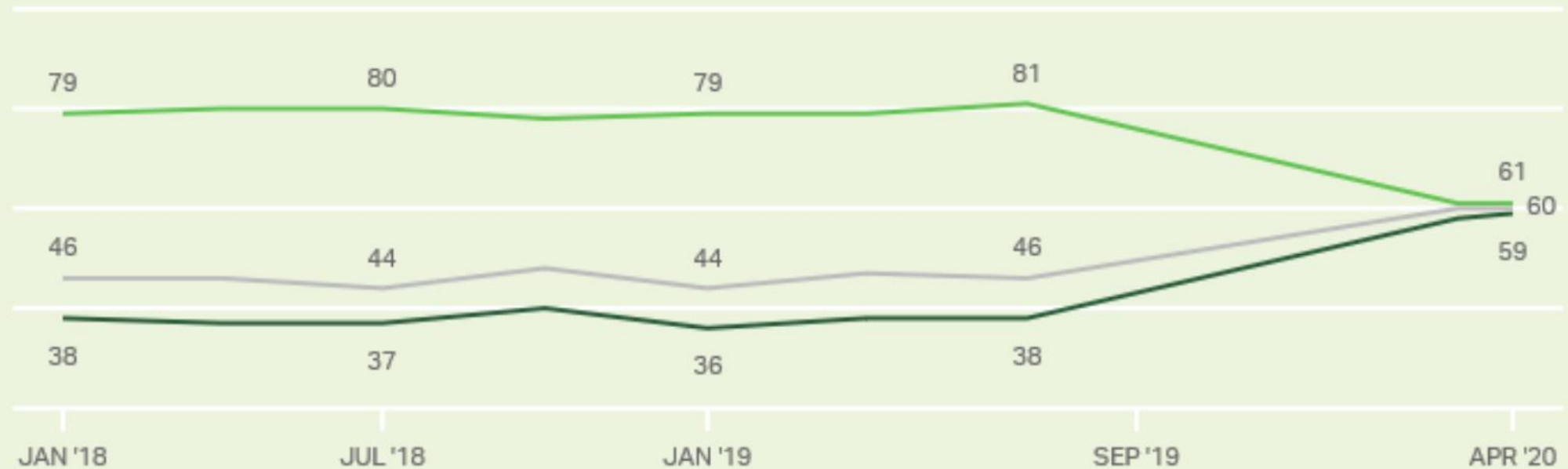
<https://news.gallup.com/poll/308276/life-ratings-plummet-year-low.aspx>

Johannes Eichstaedt, 4/16/2020. Stanford University.  
eichstaedt@stanford.edu

# Daily Emotional Experiences of U.S. Adults, Trended (January 2018–April 2020)

Did you experience each of the following a lot of the day yesterday?

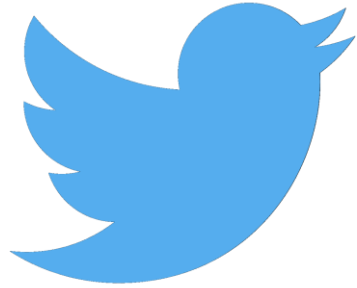
■ % Enjoyment ■ % Worry ■ % Stress



Data from January 2018 to August 2019 are based on the Gallup National Health and Well-Being Index; data from March 6-20 and March 21-April 5, 2020, are from the Gallup Panel.

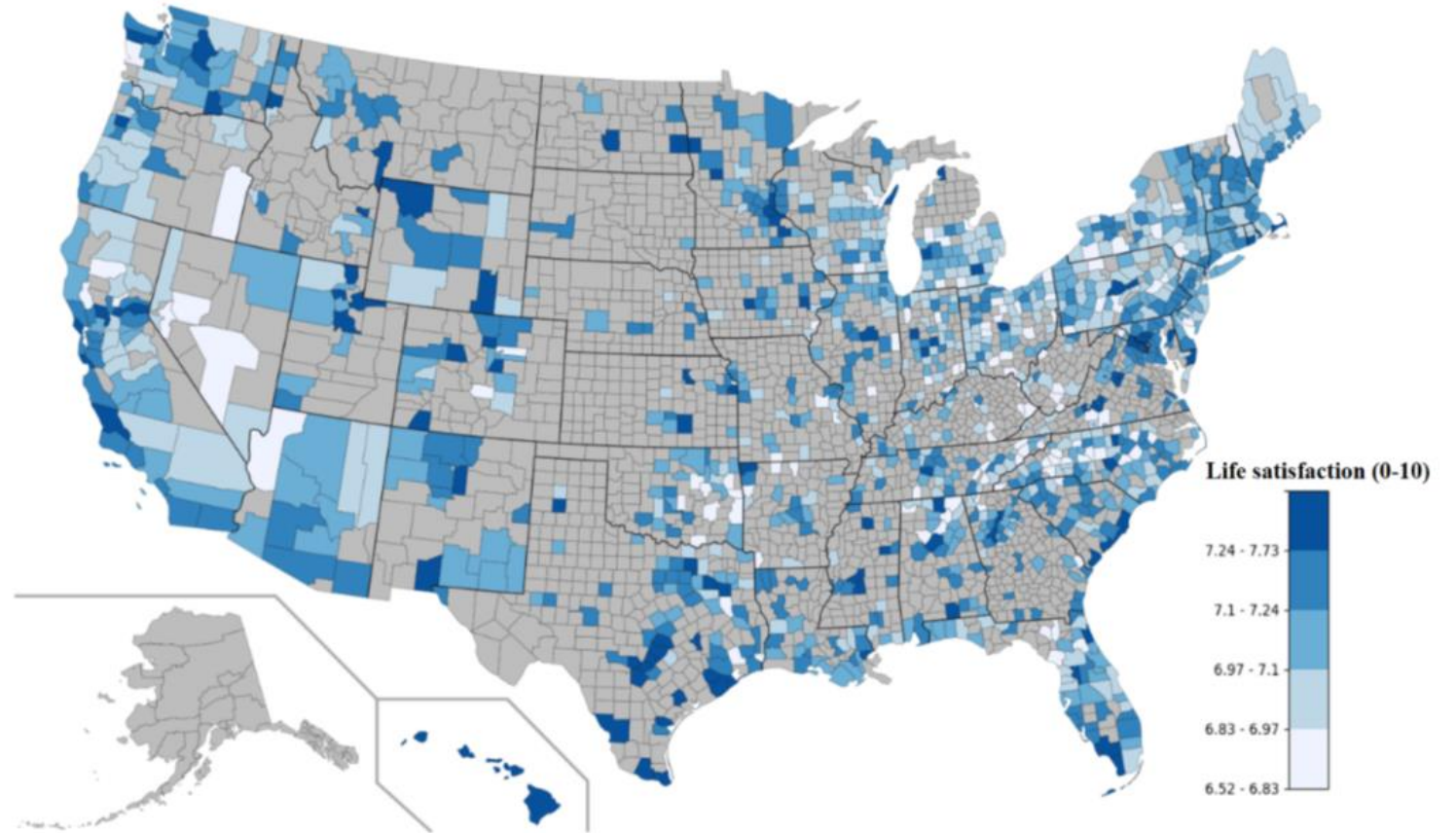
GALLUP

# Community measurement with Social Media



**1.53 billion**  
geotagged tweets  
2009 to 2015  
**+ text analysis**  
**A.I.**

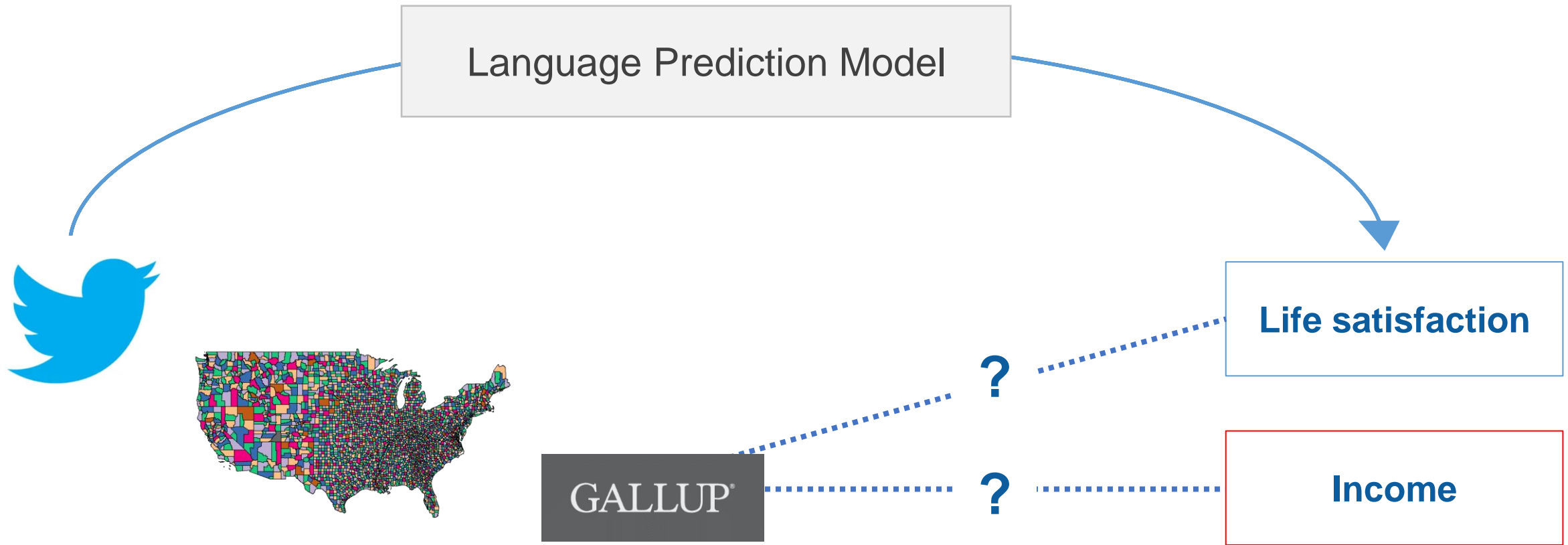
## Life Satisfaction



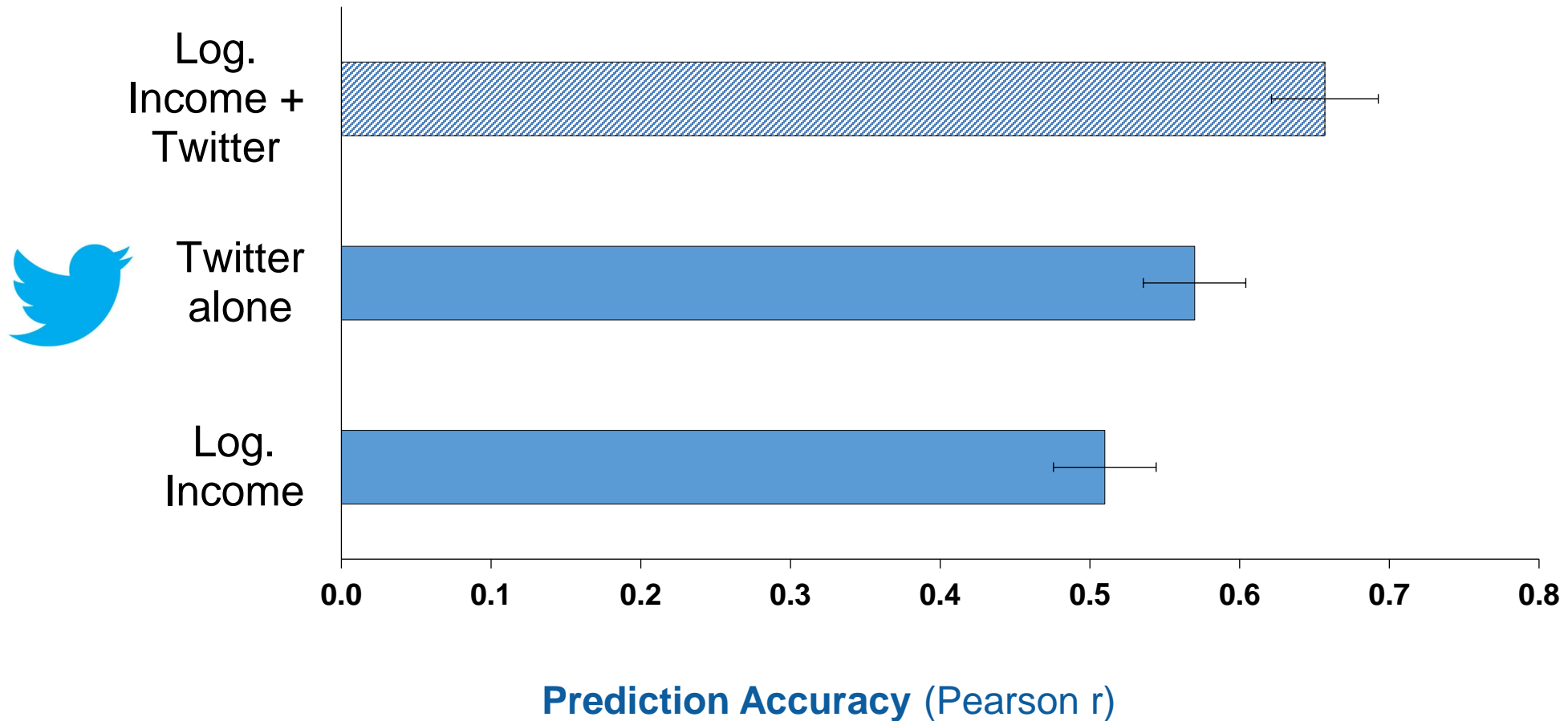
Jaidka, Giorgi, Schwartz, Kern, Ungar & Eichstaedt (2020, in press) Estimating geographic subjective well-being from Twitter: a comparison of dictionary and data-driven language methods *PNAS*



# Predicting Life Satisfaction



# Accuracy: Predicting County Life Satisfaction



Search the Well-Being Map



Explore ▾

Well-Being: PERMA

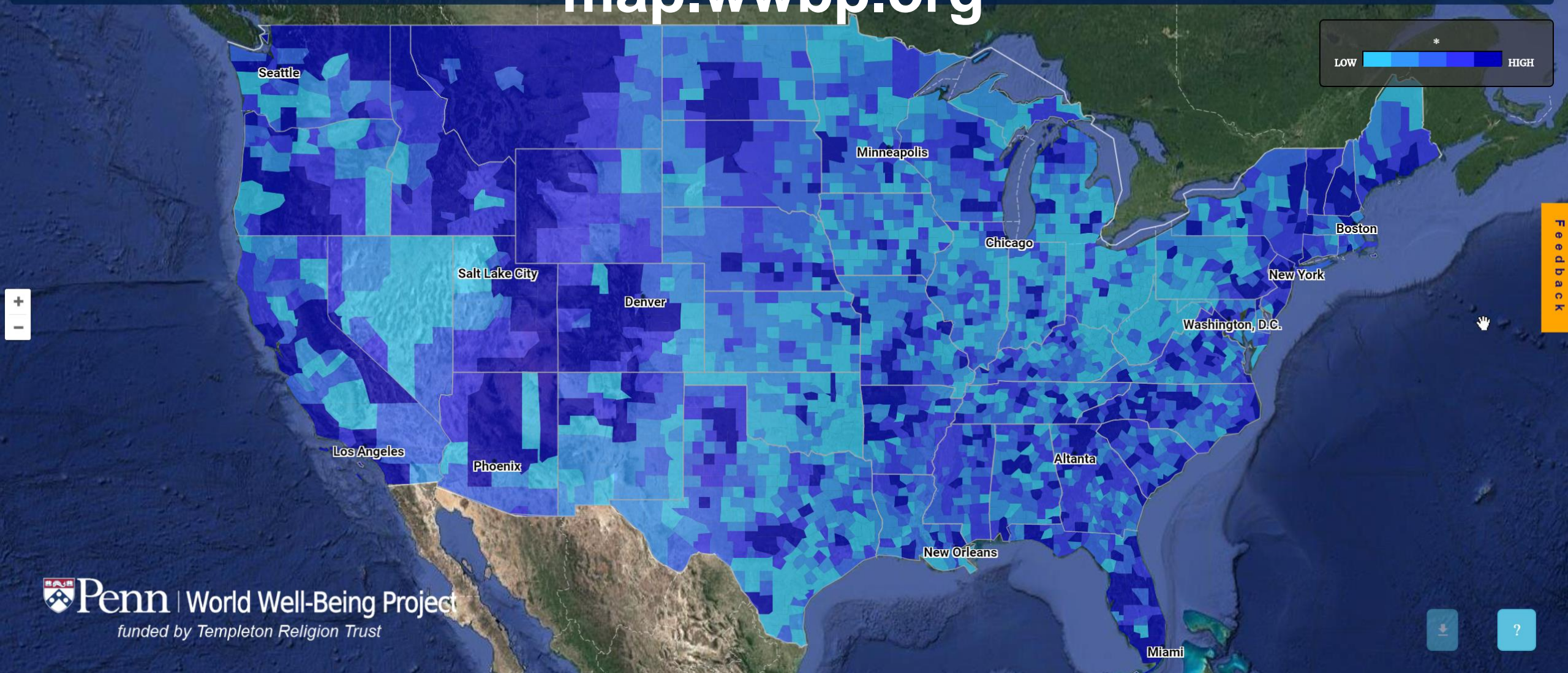
# map.wwbp.org

County Profiles

U.S. Top 10

State Top 10

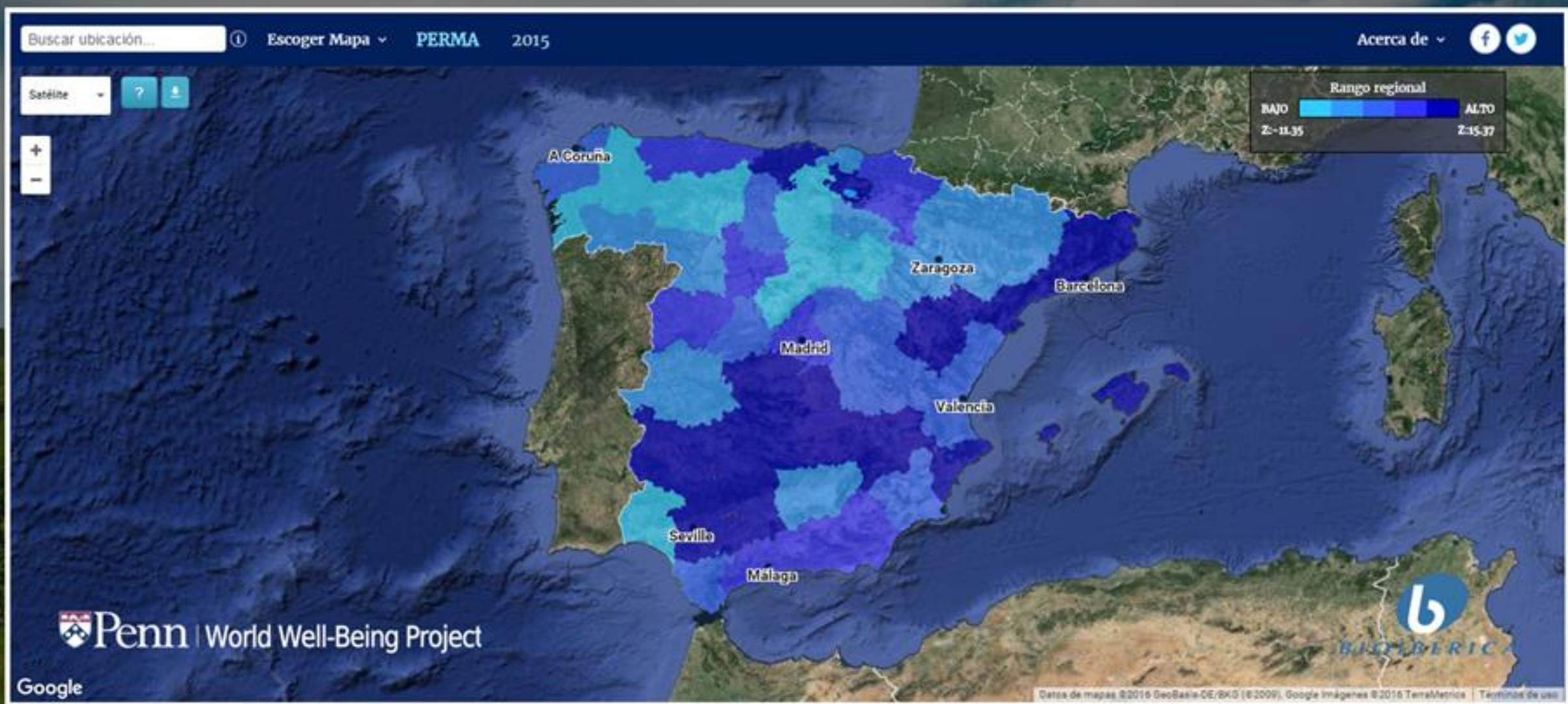
About ▾



 **Penn | World Well-Being Project**  
 funded by Templeton Religion Trust



# Mapa de Bienestar



# Using Large Social Data for COVID

[0] **Psychological impact** of COVID

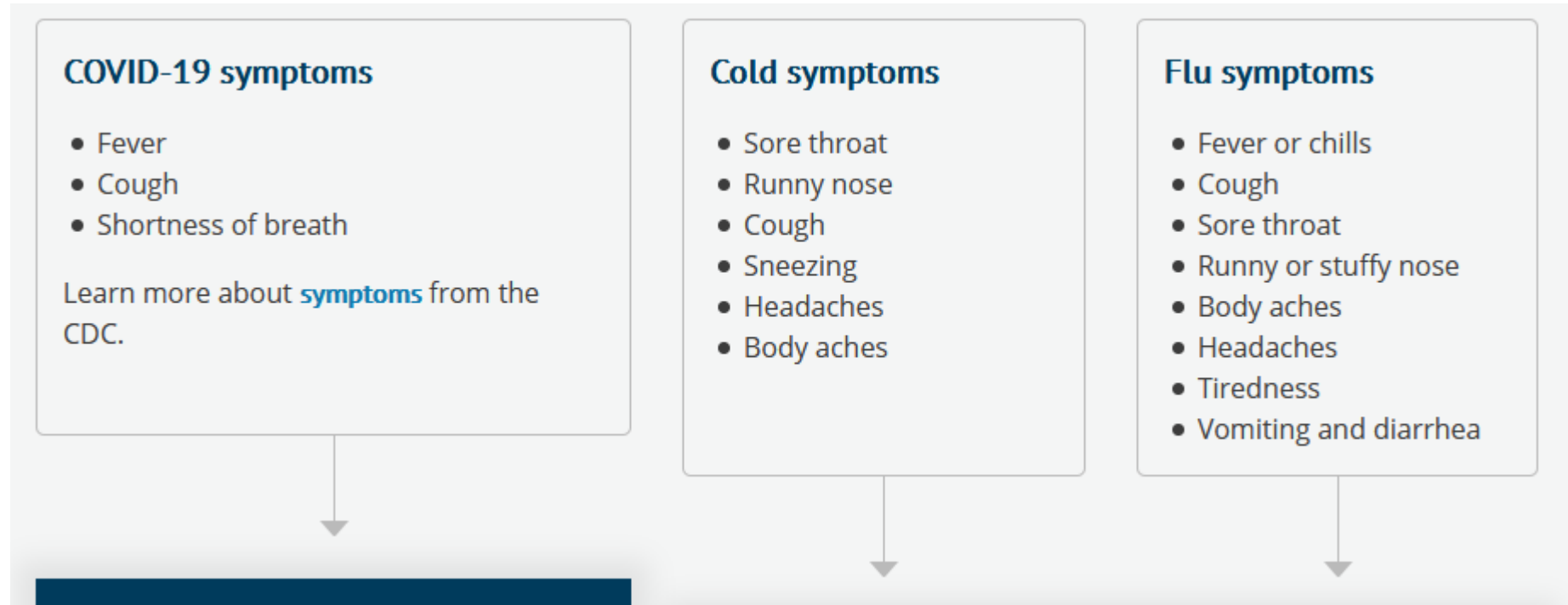
[1] **Monitoring COVID prevalence**

[2] **Adherence**

[3] COVID-related **discourse**

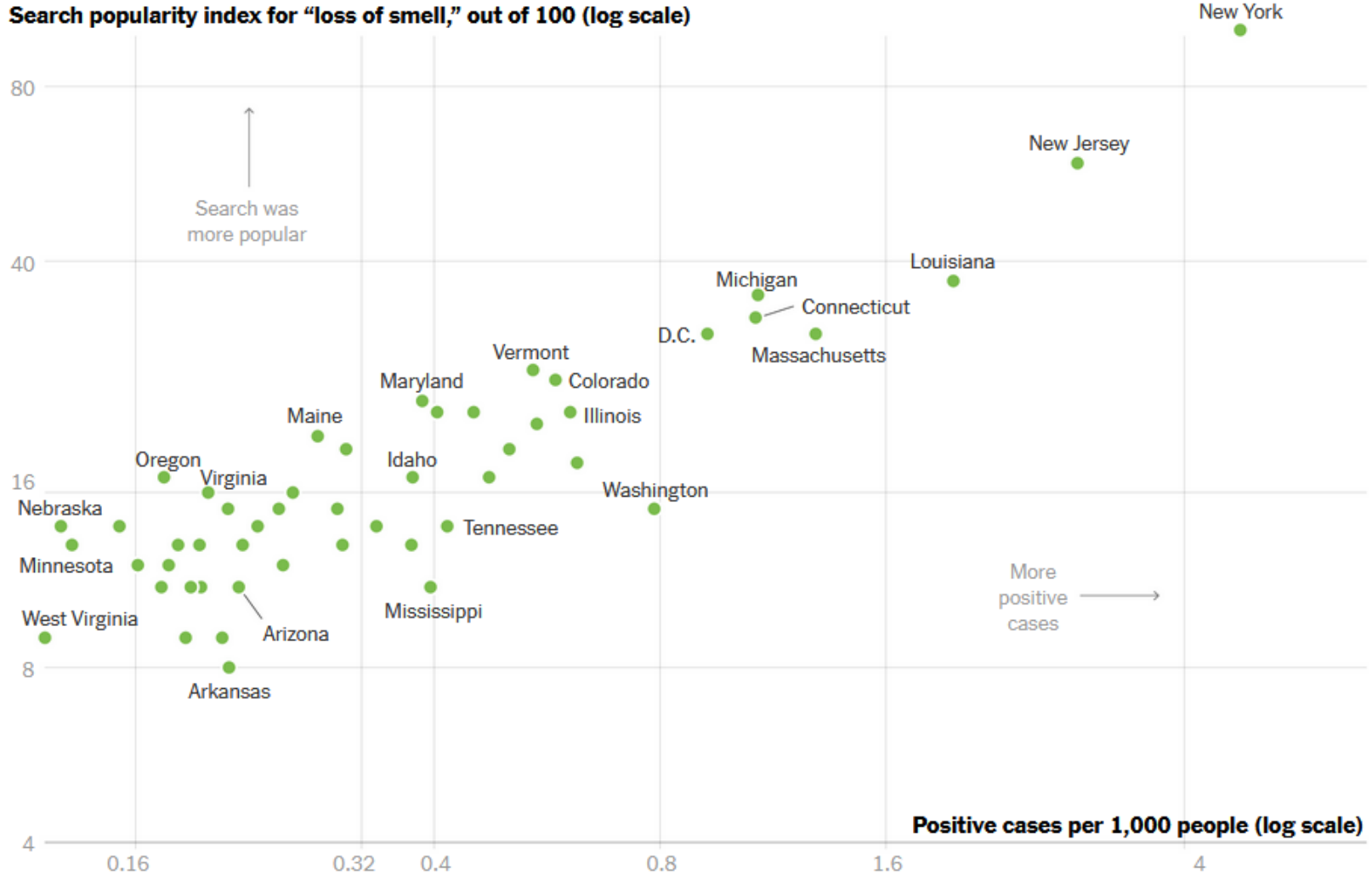
# [1] COVID prevalence tracking

Main difficulty: no specificity of COVID symptoms



Dependable COVID baselines through Google etc. are difficult.

# [1] COVID prevalence tracking



Source: Google | By The New York Times

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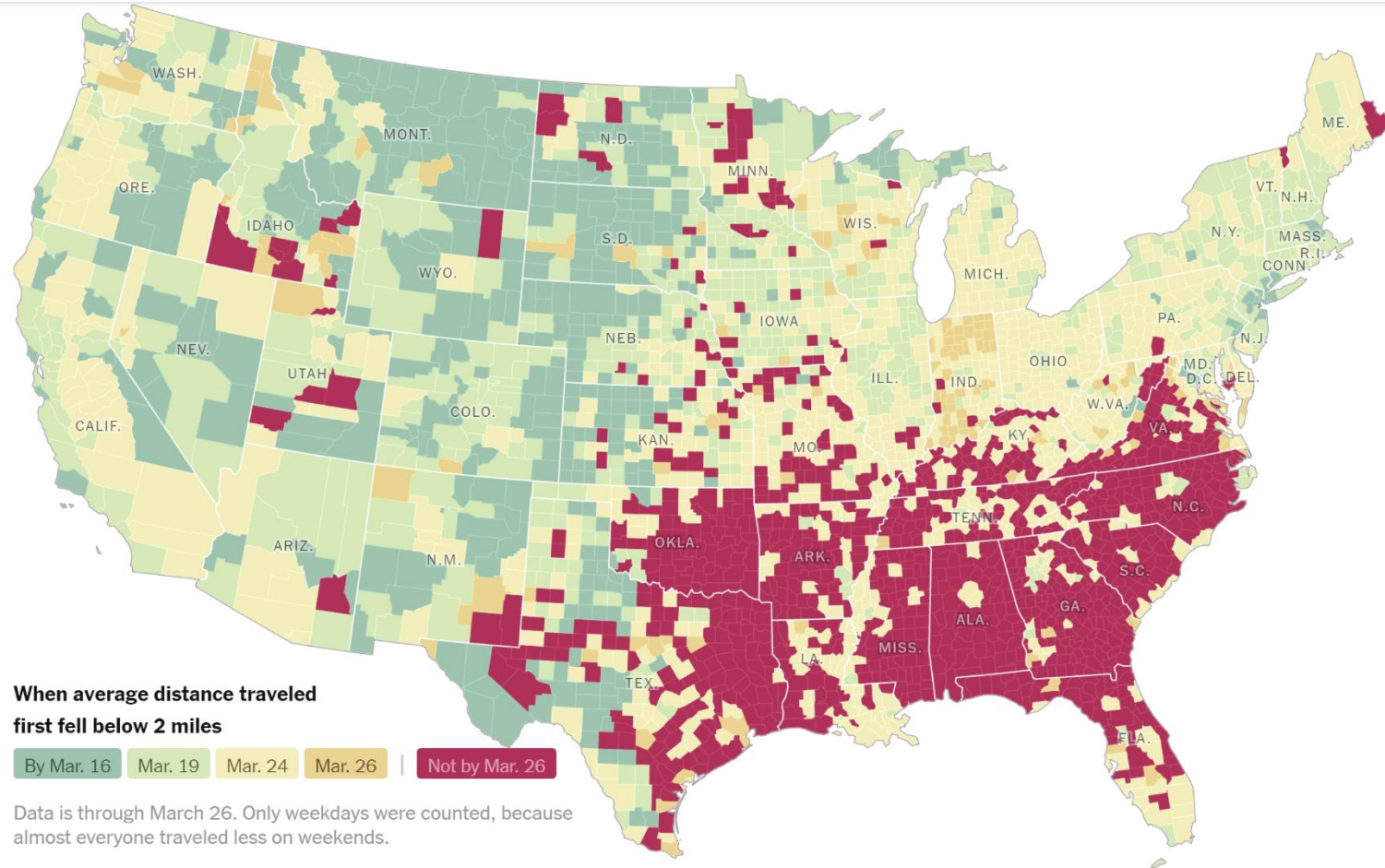
[3] COVID-related **discourse**



## [2] Compliance / Adherence

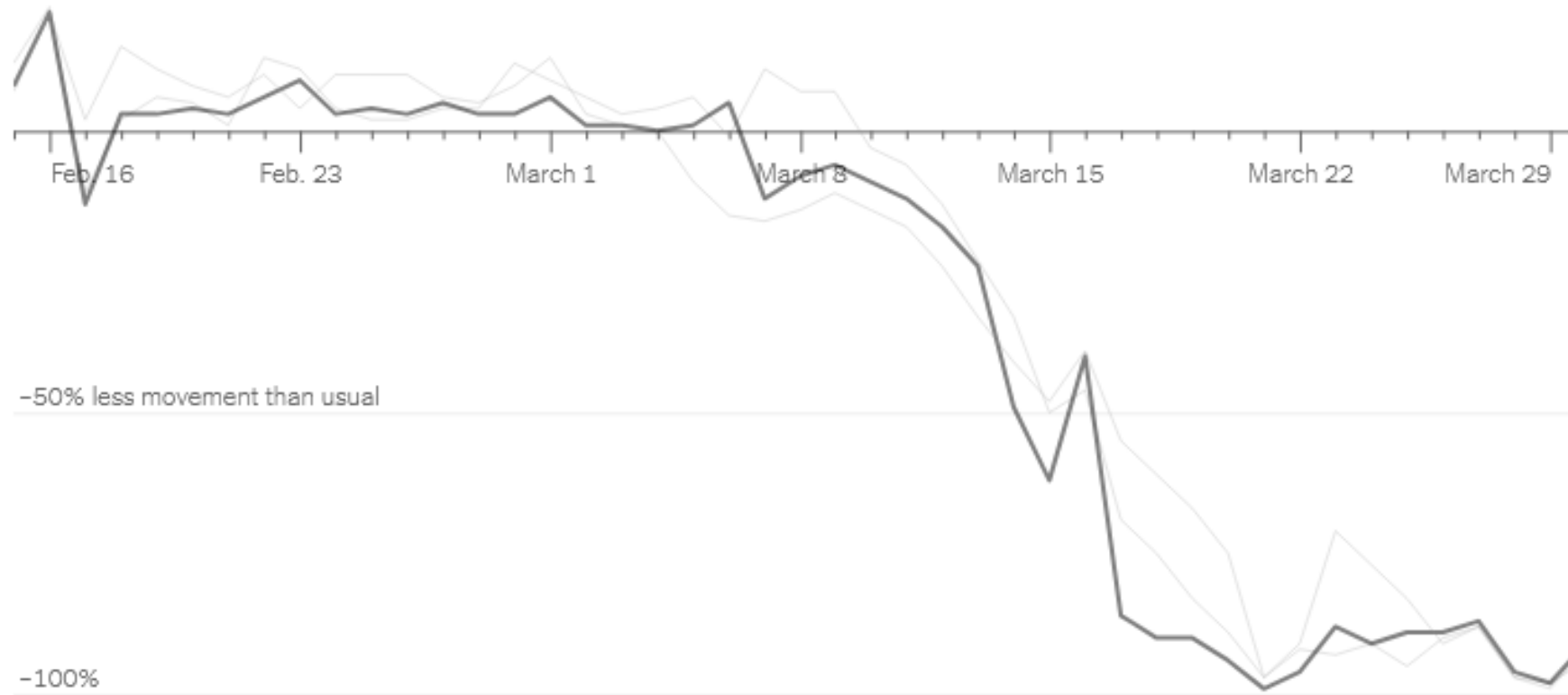
We are seeing the biggest change in social norms / behaviors since World War 2.

# When average distance traveled first fell below 2 miles



+50% more movement than usual

### San Francisco metro



-50% less movement than usual

-100%

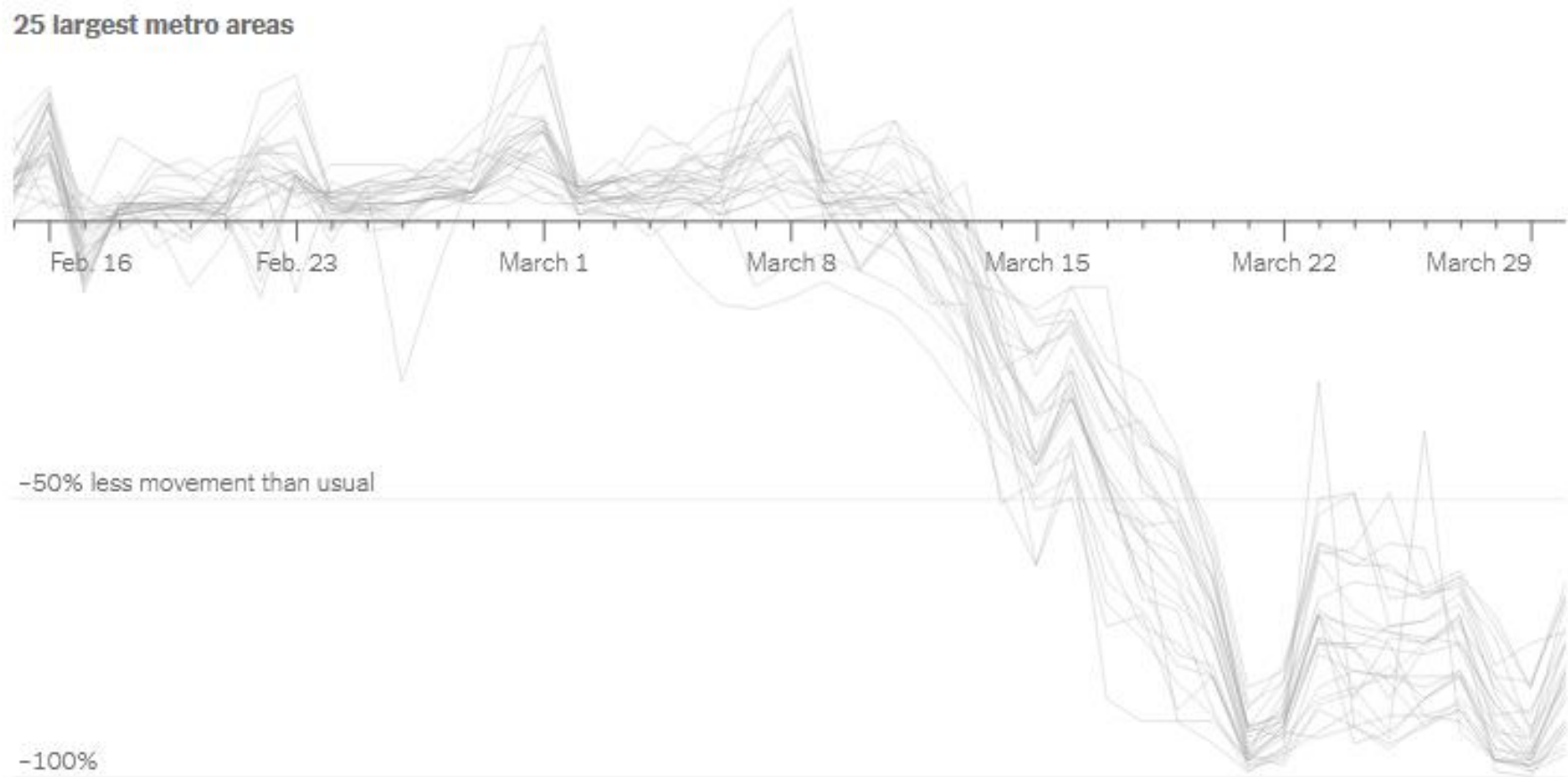
Source: <https://www.nytimes.com/interactive/2020/04/03/us/coronavirus-stay-home-rich-poor.html>



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+50% more movement than usual

### 25 largest metro areas



-50% less movement than usual

-100%

Source: <https://www.nytimes.com/interactive/2020/04/03/us/coronavirus-stay-home-rich-poor.html>



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## Americans' Readiness to Return to Normal Activities

Once government restrictions on social contact are lifted and businesses and schools start to reopen, how quickly do you think you would return to your normal activities, including interacting with people in public?

|  | <b>March 27-29</b> | <b>April 3-5</b> |
|--|--------------------|------------------|
|  | %                  | %                |
| Immediately  | 22                 | 20               |
| Wait to see what happens with the coronavirus before resuming                      | 69                 | 71               |
| Continue to limit your contact with other people and daily activities indefinitely | 9                  | 10               |

GALLUP PANEL, 2020

<https://news.gallup.com/poll/308264/americans-remain-risk-averse-getting-back-normal.aspx>



# [2] Adherence: How travel changes across March

How travel changed between Feb. 28 ...

Travel fell dramatically in Seattle, from 3.8 miles...



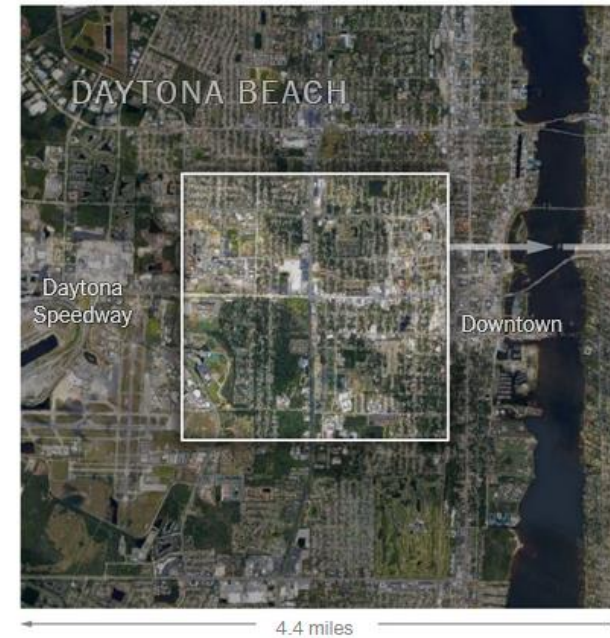
... and March 27

... to an average of 61 feet.



But in Daytona Beach, Fla. travel only fell from 4.4 miles...

... to an average of 1.9 miles.



Source: Aerial imagery from Google

## U.S. Adults' Adoption of Social Distancing Practices

There are some things people may do because of their concern about the coronavirus. For each one of the following, please indicate if this is something you have done, are considering doing or have not considered.

|           | <b>Avoided crowds</b> | <b>Avoided mass transit/air travel</b> | <b>Avoided small gatherings</b> | <b>Avoided public places</b> |
|-----------|-----------------------|--|---------------------------------|------------------------------|
|           | %                     | %                                      | %                               | %                            |
| Mar 27-29 | --                    | 89                                     | 83                              | 78                           |
| Mar 23-26 | --                    | 90                                     | 78                              | 77                           |
| Mar 20-22 | 92                    | 87                                     | 68                              | 72                           |
| Mar 16-19 | 79                    | 75                                     | 46                              | 54                           |
| Mar 13-15 | 59                    | 55                                     | 23                              | 30                           |

Avoided going to events with large crowds, such as concerts, festivals or sporting events; Avoided traveling by airplane, bus, subway or train; Avoided small gatherings of people, such as with family or friends; Avoided going to public places, such as stores or restaurants

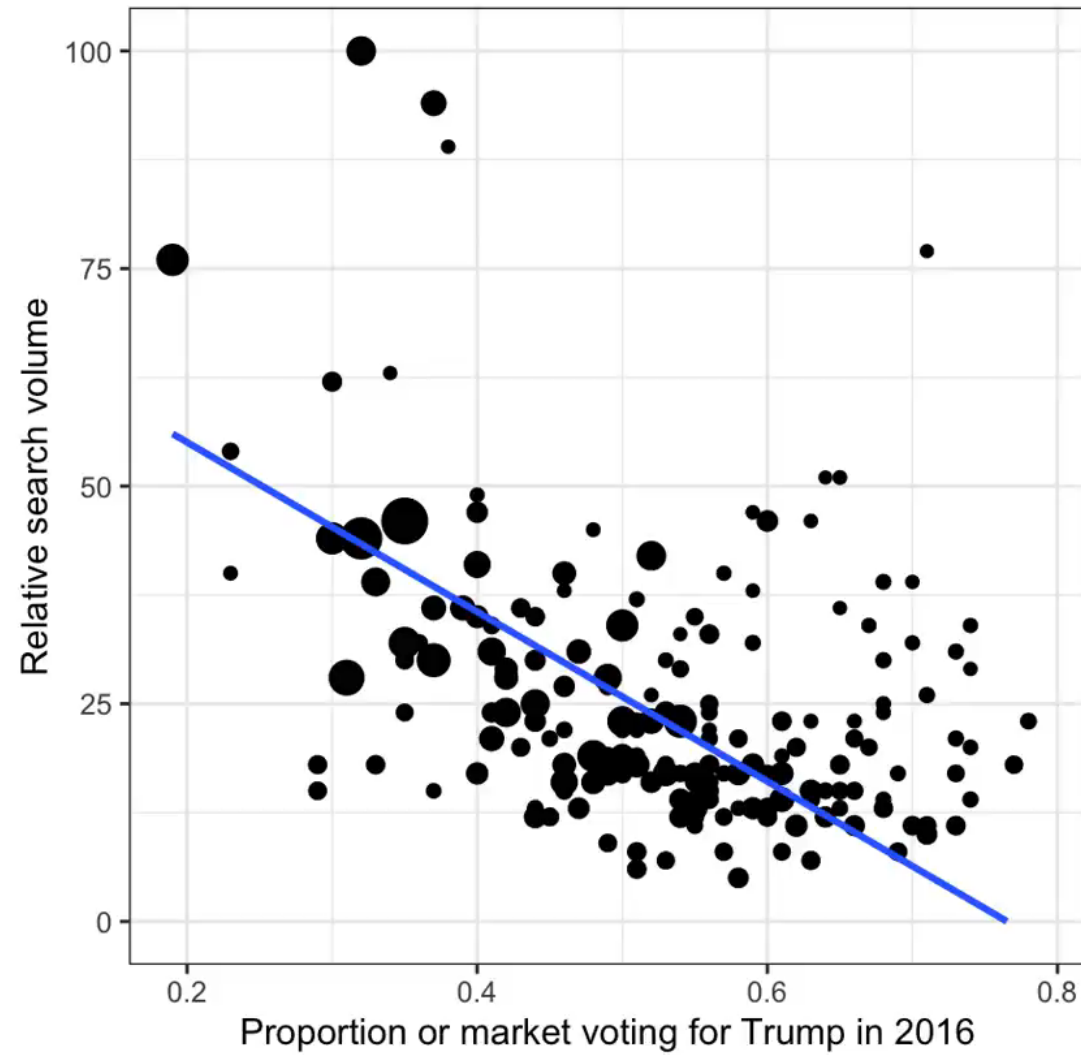
GALLUP PANEL, 2020



Source: <https://news.gallup.com/opinion/gallup/305741/gallup-data-brief-covid.aspx>  
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# Google searches for hand sanitizer across U.S. media markets

Date: 2020-03-02





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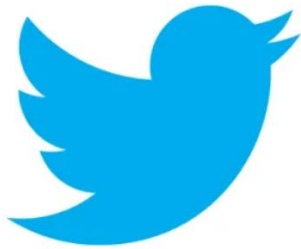
[0] **Psychological impact** of COVID

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# [3] COVID-related discourse on Twitter



Extract  
Topics



Combine with  
Census &  
other data

2 million Tweets  
w/ COVID hashtags

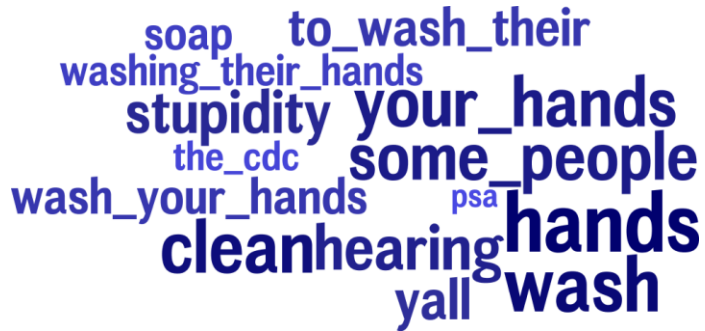
Feb 26<sup>th</sup> to Mar 26<sup>th</sup>

N = 1,015 counties

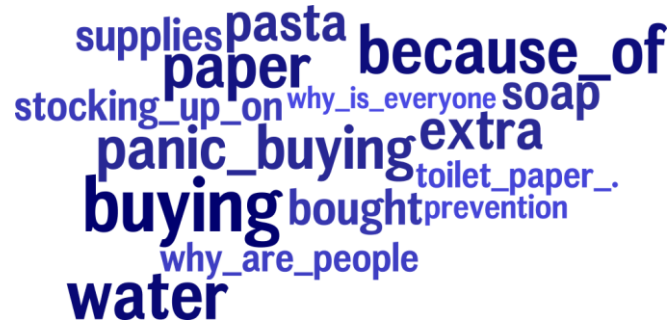
# Urban counties



Don't touch face



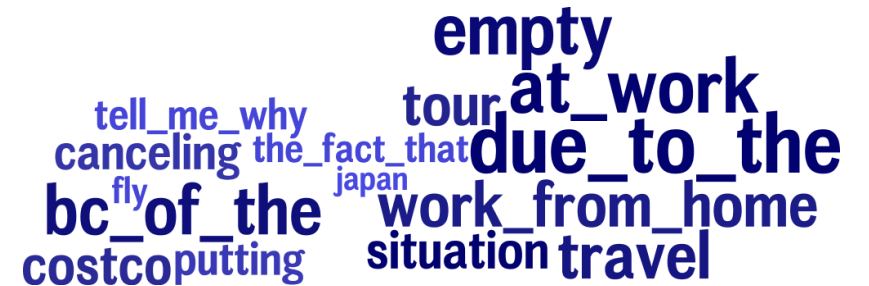
Wash Hands



Panic buying



Cancelled Events



Work from home



Methods: N = 1,015 counties, 2 million Tweets (02-27 to 03-26, no retweets or replies).  
Correlation with % Pop in Urban Area, all p's < .05, B.H.-controlled.

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eichstaedt@stanford.edu

# Educated counties



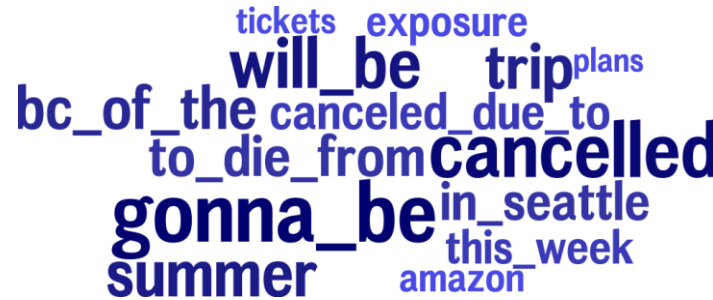
“Government”



Healthcare



Articles / news



“Will be canceled”



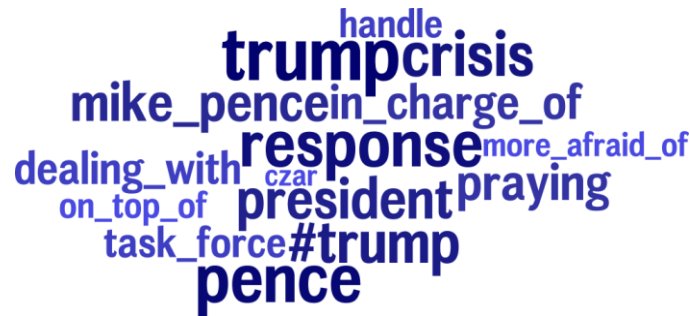
Testing

# Older counties

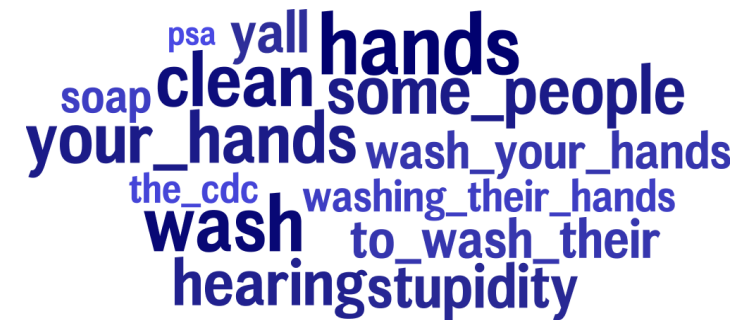
# Younger counties



**Trump**



**Economic impact**



**Wash hands**



Methods: N = 1,015 counties, 2 million Tweets (02-27 to 03-26, no retweets or replies).  
Correlation with %age < 18 or >65, all p's < .05, B.H.-controlled.

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eichstaedt@stanford.edu

# Voted for Trump



**“like the flu”**



Methods: N = 1,015 counties, 2 million Tweets (02-27 to 03-26, no retweets or replies).  
Correlation with Trump 2016 Vote Share, all p's < .05, B.H.-controlled.

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eichstaedt@stanford.edu

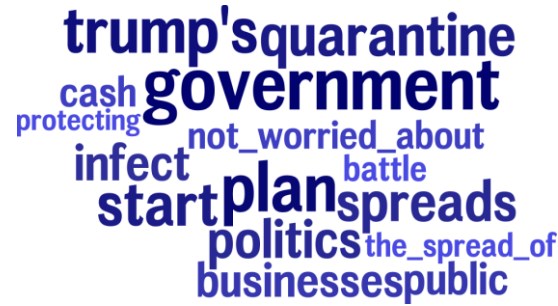
Most negative sentiment :(



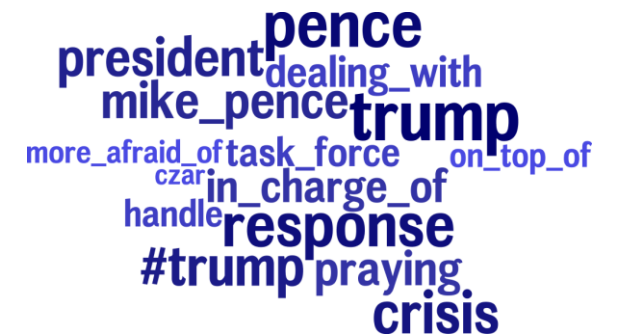
“Scared”



Economy



Trump



# Takeaways:

We need to measure the well-being impact of COVID!  
(and think about scalable mental health care.)

Signs of COVID adjustment in urban & educated communities,  
not yet in rural areas.

We can use geotagged Twitter to monitor progress in adherence  
and behaviors!

COVID tracking purely through digital traces is difficult.



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