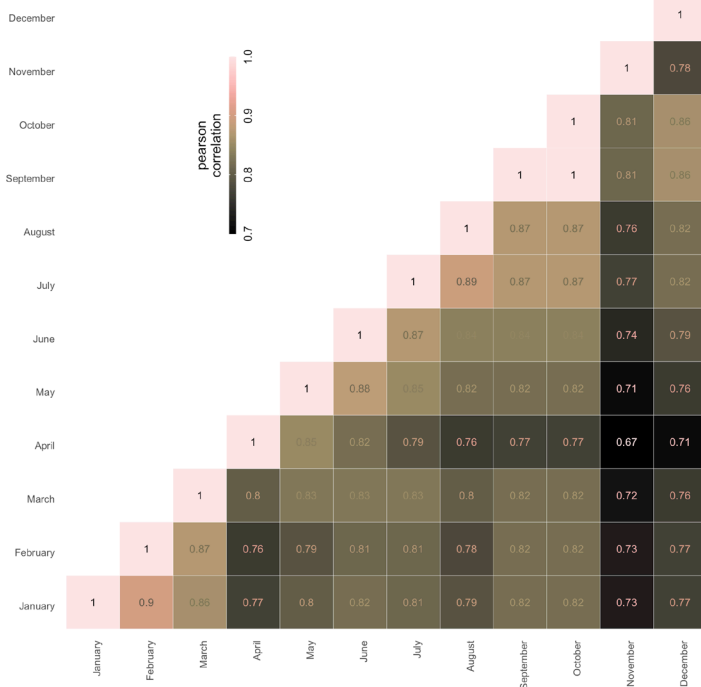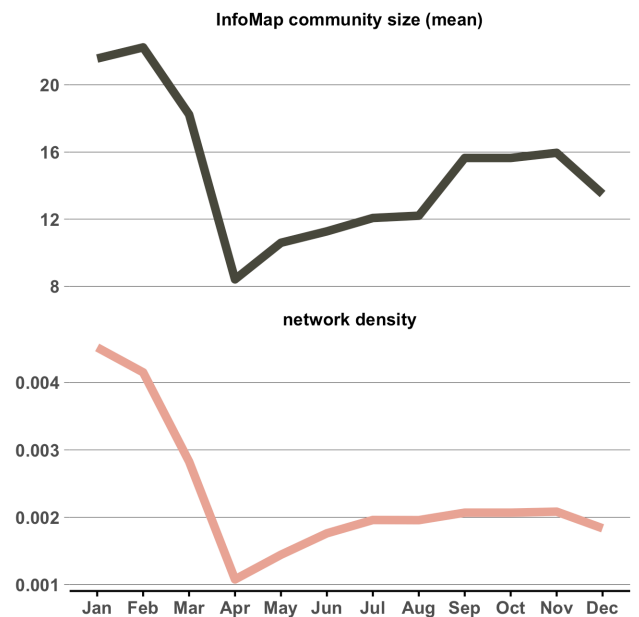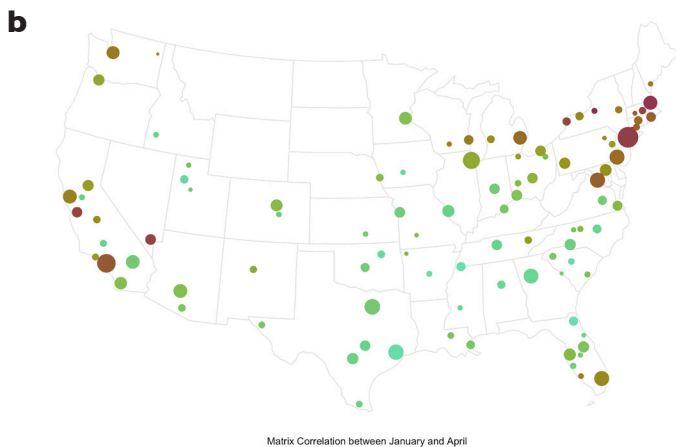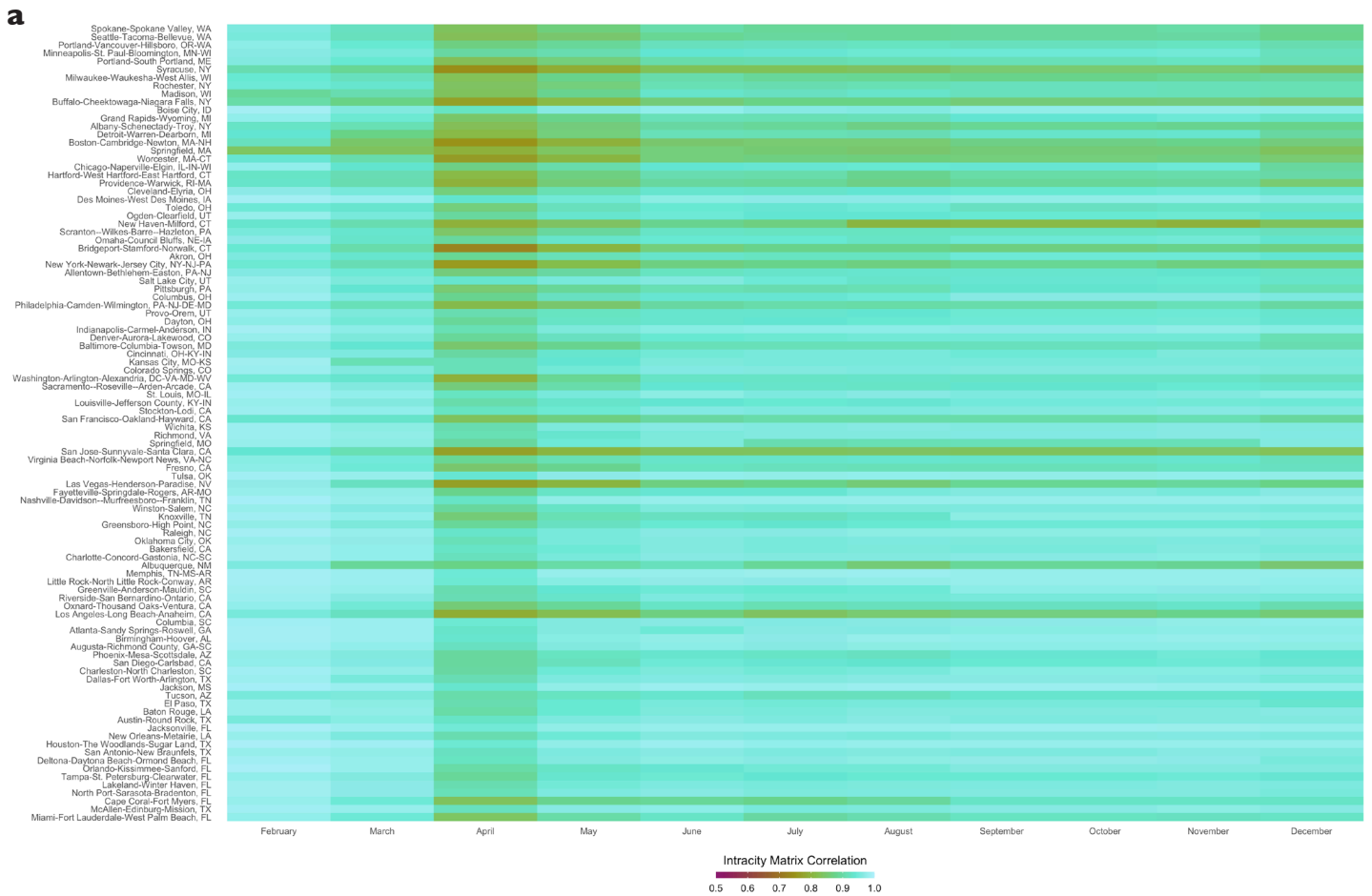**a**

b

c

The following research will attempt to track changes to urban networks over time using mobility data and to understand the consequences of those changes by creating a measure of "experienced segregation", based on mobility communities and demographic as well as socio-economic data. Based on a prior study exploring the effects of the pandemic, this panel is designed to establish the processes involved in this research using New York City as an example. Figure **a** constructs the network from origin-destination flows and maps it over time to show spatio-temporal variation. Figure **b** indicates a potential measure (graph correlation) for capturing change over time, and figure **c** shows the metrics that will allow us to compare one city to another which may be adjusted or developed over the course of the project. We will also consider measures of entropy to capture changes to the demographic configuration of the network.

a

Intracity Matrix Correlation

0.5 0.6 0.7 0.8 0.9 1.0

b

Matrix Correlation between January and April

c

Mean Degree Centrality

- Boston-Cambridge-Newton, MA-NH
- Houston-The Woodlands-Sugar Land, TX
- New York-Newark-Jersey City, NY-NJ-PA
- Phoenix-Mesa-Scottsdale, AZ
- San Francisco-Oakland-Hayward, CA

d

Network Density

With these data gathered for each (or a subset) of the metropolitan areas in the United States, we can begin to see spatial and temporal trends in the data. Figure **a** shows the correlation between a city's network in January 2020 to each other month of that year, ordered from highest to lowest latitude. Figure **b** maps the correlation between January and April to understand regional patterns, and figure **c** and **d** show changing degree centrality and network density across all cities, with 5 selected. Along with changing community structures and sizes, we can calculate the entropy index of those communities to see if "experienced segregation"—manifest in the demographic composition of one's mobility community—increases or decreases with these changes to travel during the pandemic. Challenges will include proper community detection in large, dense, often noisy networks; we may also choose to build a multiplex network with spatial interaction predicated on the types of businesses visited during a trip, adding complexity.