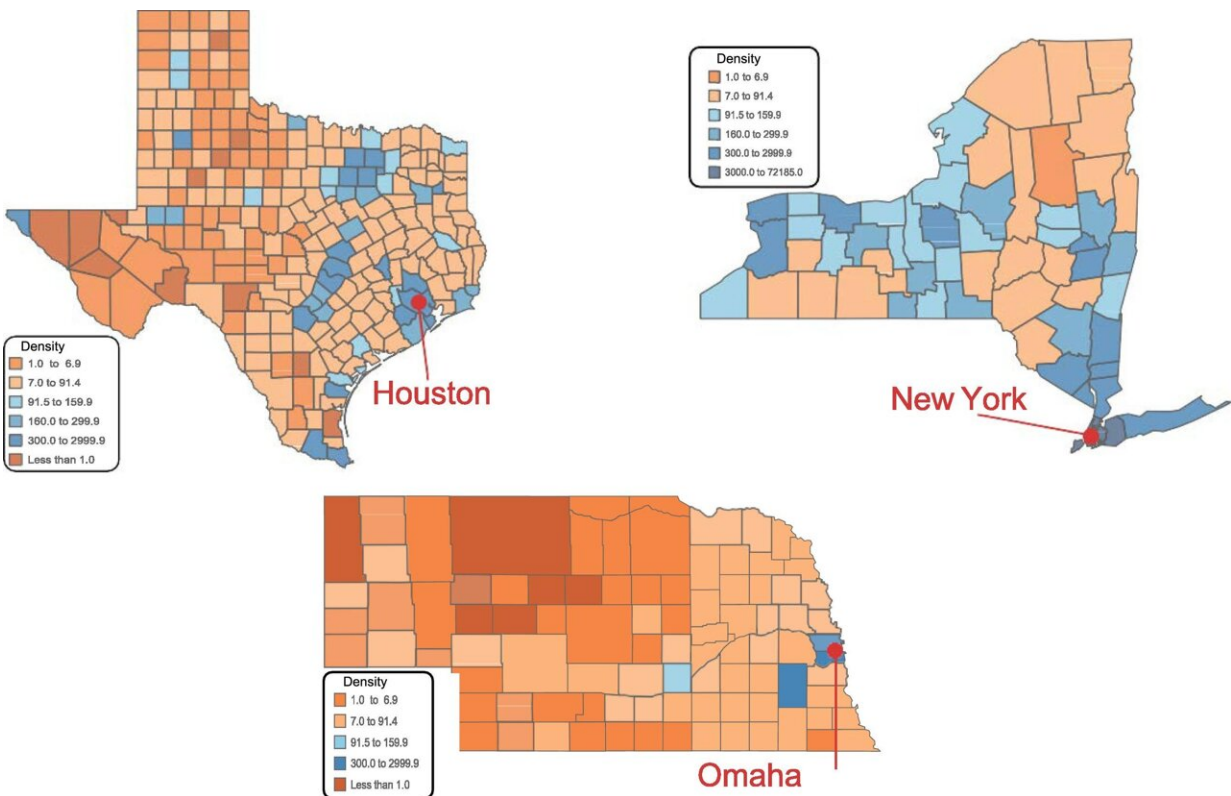# New model effectively predicts consumers' retail shopping mobility during a pandemic

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The three states and coinciding cities considered by our study with population density by county indicated with coloring. Blue indicates counties with higher population density and orange lower population density. Credit: *Journal of Business Research* (2023). DOI: 10.1016/j.jbusres.2022.113413

COVID-19 forced people to contend with travel bans, stay-at-home

orders and closure of nonessential businesses. A new study in the *Journal of Business Research* reveals how this significant event affected consumer mobility and shopping habits. And the results are hardly what one might predict.

"First off, consumers respond differently to different things depending on their location," said Michael Lash, assistant professor of business at the University of Kansas.

"Also, what we might assume people would logically respond to, they don't always respond to—they sometimes respond in the opposite way."

His paper "Predicting mobility using limited data during early stages of a pandemic" explores consumer mobility in several [metropolitan areas](#), capturing how pandemic health metrics drive consumers' risk perception and subsequently affect retail mobility. Lash co-wrote the article with S. Sajeesh and Özgür Araz of the University of Nebraska-Lincoln.

The trio analyzed these key questions: Are risk perception indicators (such as Google Trends search data) affected by risk susceptibility? Is consumer mobility affected by the risk perceptions of susceptibility and severity? Can a model predict retail mobility? How do the risk perception dimensions affect the various mobility activities in different metro areas?

Their study looked at three regions: the Northeast, South and Midwest.

"The factors driving mobility in these places, at least with respect to COVID-19, are heterogeneous. They're different in terms of both what people respond to and how they respond to them. There are different risk perceptions and tolerances, and additional differences in how those play into mobility," he said.

In some locations, searches for pandemic-related health items were associated with decreases in retail mobility, but various locations responded to different searches—disinfectant in Houston and masks in Omaha, for example.

Lash also found that in Houston, the higher the local COVID-19 case count was, the more retail mobility increased.

"Here risk factors had the opposite effect on mobility. It was among many logical flip-flops," he said.

Why was that the case?

Lash said, "The pandemic was such a divisive thing. And so many people decided, "I'm gonna do whatever is bad for me … and for you.'"

Among his team's noteworthy contributions was creating an algorithm that generated linear predictive models of consumer mobility patterns. Their model handled multicollinearity—which is when the variables included in a model are all correlated when put with one another—and selected variables for inclusion that were strictly statistically significant and contained no multicollinearity.

"We include these measures of risk severity and risk susceptibility, and we let the model figure out what's statistically important," Lash said.

"In the back of my mind as we were doing this, I thought, "Maybe after we build these models, we'll need to go back and figure out some additional data in order to build more accurate ones. But, actually, the predictions are surprisingly good with just these measurements. We use some other measurements like transit data to predict retail, grocery and pharmacy mobility, yet I was surprised at how much these variables we included were able to accurately predict things en masse."

He also notes that his paper makes a clear distinction between retail mobility (which is defined as leisurely shopping) compared to grocery or pharmacy mobility (which is more driven by needs).

"You've still got to eat and get your medicine whether there's a pandemic or not," he said.

An Iowa native, Lash started working at KU in 2019—right before the pandemic began. His expertise includes business analytics, machine learning and predictive modeling.

Lash believes this research and its valuable algorithm could be applied to other subjects as well.

"When a pandemic or something happens that drastically affects all of our lives, having a tool like this can help retail folks have a stronger idea of what to expect from a consumer," he said.

"One of the big motivators for this type of work was that people didn't really know what was going to happen as far as their businesses were concerned. Some businesses have inventory that they can keep on hand for months and months. But others, like restaurants, have perishable goods. If you have a better way of gauging what the consumer is going to be doing, then you can better prepare your inventory, for instance. So, hopefully, we wouldn't see as many establishments go out of business."