

How successful were social distancing policies during the COVID-19 pandemic?

New research points to two key factors

September 27 2022, by Tanner Stening



Credit: Ruby Wallau/Northeastern University

By now, it's settled science: social distancing helps prevent the spread of highly infectious viruses, such as COVID-19. That's why social

distancing policies, along with mask-wearing, became foundational countermeasures during the COVID-19 pandemic.

But not all policies were made equal, and many countries saw considerable variations in case counts despite putting relatively similar policies in place to combat the spread of the respiratory infection.

And when it comes to 10 European countries in particular, the number of close interactions a person has and how many people live in their household, on average, factored significantly into how successfully those nations were able to curb the spread of disease, according to new Northeastern-led research published in *Nature Computational Science*.

"Although many factors are responsible for the variances in [policy](#) success, our study shows that the micro-level structure of person-to-person interactions, measured by the average household size and in-person social contact rate, can be an important explanatory factor for policy success," the authors wrote.

After the World Health Organization declared the COVID-19 pandemic and it was clear that the virus posed an unprecedented health threat, many countries, within the span of a couple weeks, began implementing a series of policies, including [social distancing](#), mask mandates and lockdowns.

"Most of them were successful in curbing the virus, but some of them [the countries] were more successful than others," says Babak Heydari, associate professor of engineering, co-author and principal investigator of the study. Qingtao Cao, a graduating Ph.D. student in the Mechanical and Industrial Engineering department at Northeastern, also co-authored the study.

Heydari and his team became interested in studying those differences, or

the underlying reasons that some countries saw fewer cases compared with others despite having similar policies. Their suspicion, Heydari says, was that the strength of the policies wasn't sufficient to account for variations.

"Not all the differences in success could be explained by differences in the policies stringencies," Heydari says. "So we thought, there is something else out there, and that is some of the differences in these micro-structural factors in the ways that people interact with each other."

Specifically, the researchers identified the average size of the household and the ratio (or rate) of close interactions—they define close interactions as those that are in-person that take place for around 10 to 15 minutes—as two key factors that shed light on case count differences. The average household size was data that was readily available, he says. But researchers used the results of a European survey that sought to measure social interactions as the basis of the countries' average number of close contacts.

"We hypothesized that actually we can explain a lot by looking at these two variables," he says.

Heydari says there simply wasn't enough [reliable data](#), such as total case counts, from countries to produce a straightforward statistical analysis. So the researchers had to build a model.

"And that's what we did," Heydari says. "We built these complex network models that replicated the social interactions in these countries."

What surprised researchers, Heydari says, was that when they ran the model, generating the results in terms of case counts, the resulting case counts in the 10 [countries](#), after two months, were closely aligned with the real-world data.

"And that tells us two things," Heydari says. "First is that these micro-structural factors are way more important than previously thought. Of course, everybody knew that social interactions were important" to preventing disease transmission.

But showing that they matter "so much that they can actually be replicated through this model—this is one of the more significant results of the paper," Heydari says.

"And secondly," he continued, "everything was based on national averages, which means that if we make the model even more complex ... we can increase the accuracy."

More information: Qingtao Cao et al, Micro-level social structures and the success of COVID-19 national policies, *Nature Computational Science* (2022). [DOI: 10.1038/s43588-022-00314-0](https://doi.org/10.1038/s43588-022-00314-0)

Provided by Northeastern University

Citation: How successful were social distancing policies during the COVID-19 pandemic? New research points to two key factors (2022, September 27) retrieved 8 May 2024 from <https://medicalxpress.com/news/2022-09-successful-social-distancing-policies-covid-.html>

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