

Concerns over infecting others matter more for vaccination in sparsely populated areas

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Concerns over infecting others play a greater role in people's willingness to be vaccinated in sparsely populated areas than dense urban ones, according to newly published findings in the *Proceedings of the National Academy of Sciences (PNAS)* of the United States.

Researchers at the University of Illinois at Urbana-Champaign and the Annenberg Public Policy Center (APPC) of the University of

Pennsylvania examined people's behavior getting a [flu vaccine](#) as well as their future intentions to be vaccinated against the flu and COVID-19.

Given that they encounter more people and have a greater risk of transmitting disease, it might seem that people in urban environments would be more highly motivated to vaccinate because of 'prosocial' concerns—to protect others. But that is not what the research found.

"Contrary to the common intuition that prosocial concern should motivate vaccination more in denser areas with more [social contacts](#) and disease transmission risk, our results showed that prosocial concern yields higher vaccination rates in sparser areas where people believe that their behavior will have more impact," the researchers concluded.

Social density and altruism

"We know that the degree to which people act for the benefit of others—the degree to which they act in an altruistic manner—depends on their perception that they're likely to have an impact," said co-author Dolores Albarracín, a professor of psychology and business administration at the University of Illinois at Urbana-Champaign and a distinguished research fellow at APPC.

"People are equally concerned for others in rural and [urban environments](#)," Albarracín said. "But in cities they don't think they have as much impact. They feel less influential, that their contribution is a drop in the bucket. In practice, they are less likely to act altruistically—not because they don't want to help or don't care for others, but because they think there is not that much they can do in a city as opposed to people in a little community of, say, five blocks."

This research has important implications for public health communications about vaccination, the researchers said. It identified

"emphasizing prosocial aspects of vaccination as one means by which public health interventions can reduce the rural-urban disparity in vaccination."

Herd immunity in urban and rural areas

Vaccination protects both the individual from disease and the community at large. High levels of vaccination are needed to protect the community, a phenomenon referred to as herd immunity or community protection.

"Many people think of vaccination as a personal choice," said co-author Haesung Jung, a postdoctoral researcher at the Social Action Lab of the University of Illinois at Urbana-Champaign. "It's not only a personal decision but a social one. With infectious diseases, there is a higher probability you are also going to infect others—so in that sense, getting vaccinated is a social decision, as people can lower the likelihood of transmitting disease to others."

"Prior research has shown that if you think of vaccination as a prosocial decision instead of an individual decision, that increases vaccination," Jung added. "We examined whether this framing is more or less effective across environments with different social densities. The COVID-19 pandemic showed that social density is linked to how fast the virus spreads. So we thought it was important to quantify how social density affects people's willingness to vaccinate for the sake of others."

Three studies: A national survey and two experiments

The researchers based their findings on data from a survey and two experiments: a nationally representative, longitudinal survey of 2,490 Americans conducted by the Annenberg Public Policy Center, and

follow-up experiments establishing causality that were conducted by the University of Illinois at Urbana-Champaign.

APPC's Annenberg Science Knowledge (ASK) survey measured vaccination behavior at six different times from September 2018 through October 2019, spanning the 2018-19 flu season. The survey results showed that people were consistently more likely to be vaccinated when their prosocial concerns were higher. Notably, these prosocial concerns had a larger positive effect on vaccination when the survey participants lived in regions that were nonmetropolitan, had a lower population density, and a lower proportion of urban land area.

For the first follow-up experiment, during the 2019-20 winter flu season, 240 online participants were recruited. They were presented with a simulated environment, a shoe store, that was manipulated to be high or low density, and were shown information about both individual and prosocial benefits of flu vaccination. Half of them were asked to recall and write about the prosocial benefits and the other half about the individual benefits. The results showed that in the low-density group, participants in the prosocial condition thought their vaccination would have a greater impact on others, which positively influenced their intention to be vaccinated.

The second experiment, in June 2020, involved a nationally representative sample of 560 U.S. adults who took part in an online survey. As in the first experiment, they were randomly assigned to one of four conditions produced by combining social density (high or low) and [vaccine](#) concerns (individual or prosocial). The experiment examined the effects of social density and intention to vaccinate against COVID-19 and similarly found that "[w]hen social density was low, prosocial concern increased the perceived impact of vaccination, which, in turn, led to stronger vaccination intentions."

Implications and potential future research

The authors suggested that future research could look at whether prosocial concerns and social density are critical to other preventive behaviors for COVID-19, such as physical distancing, mask-wearing, and handwashing, and whether these findings about the flu and COVID-19 vaccines may be generalized to other vaccines. They also suggested looking at whether prosocial concerns could make people less willing to vaccinate under certain circumstances. For example, if most people are immune to a particular infectious disease, they may not be motivated to vaccinate for others since their vaccination would have minimal impact.

In theory, social density may influence additional behaviors considered to affect other people's well-being, such as taking part in social movements that affect gender and racial equality. Or, the researchers noted, these findings could be applied to spaces such as hospitals, college dorms, schools, and workplaces, where social density in the immediate environment may affect the processes that lead to altruistic behavior.

The researchers thank the APPC 2018-2019 ASK (Annenberg Science Knowledge) group, including the survey design and administration team: APPC postdoctoral fellows Ozan Kuru, Dominik Stecula, Hang Lu, and Yotam Ophir; Man-pui Sally Chan of the University of Illinois at Urbana-Champaign; Ken Winneg, APPC's managing director of survey research; and Kathleen Hall Jamieson, APPC's director.

The 2018-19 ASK survey data were also used in other Annenberg vaccination studies, including:

- "Policy Views and Negative Beliefs About Vaccines in the United States, 2019" (*American Journal of Public Health*, October 2020)

- "Prospective associations of regional social media messages with attitudes and actual vaccination: A big data and survey study of the influenza vaccine in the United States" (*Vaccine*, September 2020)
- "Intentions to Seek Information About the Influenza Vaccine: The Role of Informational Subjective Norms, Anticipated and Experienced Affect, and Information Insufficiency Among Vaccinated and Unvaccinated People" (*Risk Analysis*, February 2020)
- "How trust in experts and media use affect acceptance of common anti-vaccination claims" (Harvard Kennedy School Misinformation Review, January 2020)

"Concerns for others increase the likelihood of vaccination of influenza and COVID-19 more in sparsely rather than densely populated areas," was published in *PNAS* on December 18, 2020.

More information: Concerns for others increase the likelihood of vaccination of influenza and COVID-19 more in sparsely rather than densely populated areas. *PNAS*. December 18, 2020. [DOI: 10.1073/pnas.2007538118](https://doi.org/10.1073/pnas.2007538118) , www.pnas.org/content/118/1/e2007538118

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