

Researchers unravel what makes someone a COVID-19 superspreader

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Chad Roy, PhD, corresponding author of the study and director of infectious disease aerobiology at the Tulane National Primate Research Center. Credit: Tulane University

Scientists and public health experts have long known that certain individuals, termed "super-spreaders," can transmit COVID-19 with incredible efficiency and devastating consequences.

Now, researchers at Tulane University, Harvard University, MIT and Massachusetts General Hospital have learned that obesity, age and COVID-19 infection correlate with a propensity to breathe out more [respiratory droplets](#)—key spreaders of SARS-CoV-2, the virus that causes COVID-19. Their findings were published in *Proceedings of the National Academy of Sciences*.

Using data from an [observational study](#) of 194 healthy people and an experimental study of nonhuman primates with COVID-19, researchers found that exhaled [aerosol particles](#) vary greatly between subjects. Those who were older with higher body mass indexes (BMI) and an increasing degree of COVID-19 infection had three times the number of exhaled respiratory [droplets](#) as others in the study groups.

Researchers found that 18% of the human subjects accounted for 80% of the exhaled particles of the group, reflecting a distribution of exhaled aerosol particles that follows the 20/80 rule seen in other infectious disease epidemics—meaning 20% of infected individuals are responsible for 80% of transmissions.

Aerosol droplets in [nonhuman primates](#) increased as infection with COVID-19 progressed, reaching peak levels a week after infection before falling to normal after two weeks. Notably, as infection with COVID-19 progressed, viral particles got smaller, reaching the size of a single micron at the peak of infection. Tiny particles are more likely to be expelled as people breathe, talk or cough. They can also stay afloat much longer, travel farther in the air and penetrate deeper into the lungs when inhaled.

The increase in exhaled aerosols occurred even among those with asymptomatic cases of COVID-19, said Chad Roy, Ph.D., corresponding author and director of infectious disease aerobiology at the Tulane National Primate Research Center.

"We've seen a similar increase in droplets during the acute [infection](#) stage with other infectious diseases like tuberculosis," Roy said. "It seems likely that viral and bacterial infections of the airway can weaken airway mucus, which promotes the movement of infectious particles into this environment."

The generation of respiratory drops in the airways varies between people depending on their body composition, said lead author David Edwards, Ph.D., professor of the practice of biomedical engineering at Harvard University.

"While our results show that the young and healthy tend to generate far fewer droplets than the older and less healthy, they also show that any of us, when infected by COVID-19, may be at risk of producing a large number of respiratory droplets," Edwards said.

More information: David A. Edwards et al, Exhaled aerosol increases with COVID-19 infection, age, and obesity, *Proceedings of the National Academy of Sciences* (2021). [DOI: 10.1073/pnas.2021830118](https://doi.org/10.1073/pnas.2021830118)

Provided by Tulane University

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