

# College campuses can be superspreaders, but they don't have to be

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As higher education institutions continue to weigh welcoming students back to campus next term, a study [published](#) Wednesday in *Computer Methods in Biomechanics and Biomedical Engineering* suggests colleges that take the right precautions can reopen safely amid the pandemic despite experiencing “an extreme incidence” of COVID-19 in the initial weeks of fall classes that also impacted surrounding communities.

The implication is that U.S. colleges and universities are “definitely at risk to be a superspreader,” said Ellen Kuhl, a Stanford University mechanical engineering professor who authored the paper alongside students from her fall-quarter [course](#) “Data-driven modeling of COVID-19.” And the study illustrated that institutions' successful efforts to control the disease’s spread on campus have not always extended to surrounding communities.

The researchers lacked the data to explore whether campuses met the technical mathematical definition of one of 2020’s defining words, but hyper-local places with very high incidences of the disease can be considered superspreaders.

“That definitely has been the case, and that has been the case for all the colleges we looked at,” Kuhl said.

Through new documentation of the high rates of virus incidence occurring in the two weeks after fall classes began, the study of 30 campuses found that 14 had spikes at their peak “well above” 1,000 cases per 100,000 people per week, and each exceeded the common threshold for high-risk areas of 50 per 100,000.

At 17 institutions, local campus outbreaks also triggered a peak in new infections in neighboring communities within two weeks, the researchers learned using a modernized computer model for epidemiological diseases that was combined with statistical methods from machine learning to analyze the case data. That also allowed the team to generate a reproduction number for each campus to represent how many additional people are infected by one infected person.

At 18 campuses, the maximum incidence of COVID-19 appeared within Aug. 19 through Oct. 10 — between the second and third U.S. infection waves.

“This suggests that these initial college outbreaks are unrelated to the national outbreak dynamics. Instead, they are independent local events driven by campus reopening and inviting students back to campus,” the study said. “Our results are a quantitative confirmation of the common fear in early fall that colleges could become the new hot spots of COVID-19 transmission.”

Throughout the fall, the institutions with the highest maximum seven-day per 100,000 incidence of COVID-19, a metric illustrating the magnitude of an outbreak, were the University of Notre Dame — where more than nine in 10 students are from out of state — with 3,083; the University of Arizona, with 2,700; and Clemson University, with 2,685. These were also the only three institutions to exceed the 50-per-100,000 threshold by two orders of that magnitude.

The study's authors also called out the former two institutions in a discussion of what they deemed a striking finding: While campus and county outbreak dynamics largely tracked together during the first half of the term, during the second half, county case numbers rose steadily, regardless of what was happening on campus. This was especially apparent at certain institutions.

“There is some local superspreading in the campus,” Kuhl said. “At least half of them spread very rapidly outside the tight campus community into the county, so in that sense, that’s a real superspreading.”

Comparing the 21 days before and after classes began in the fall, a Centers for Disease Control and Prevention [study](#) released Friday revealed that U.S. counties with large colleges or universities where instruction took place remotely saw a 17.9% decline in COVID-19 incidence, while those with in-person instruction experienced a 56% increase. Counties without such institutions, meanwhile, saw a 6% decrease.

The latest findings enter the public sphere four days after Stanford, the first university in the country to switch entirely to online instruction because of the pandemic, called off plans to have freshmen and sophomores return to campus for the winter quarter that started Monday. In delivering the message, university administrators noted that COVID-19 cases in California have “skyrocketed” since they last communicated on the topic early last month.

“We deeply regret having to change plans,” University President Marc Tessier-Lavigne and Provost Persis Drell said. “We have concluded that doing so is in the best interest of students and our community, though we know many students will be disappointed.”

The University of Pittsburgh also told students to stay home until at least the last week of January, despite classes being scheduled to start next week. And the University of North Carolina at Chapel Hill said last week that its first three weeks of undergraduate instruction will now take place online.

The universities are making these decisions while more than 1,900 colleges had seen over 397,000 cases of COVID-19 as of Dec. 11 since the pandemic’s start, according to The New York Times. But only around 90 deaths have been recorded, and most of those have been among employees rather than students, putting the campus-related death rate at 0.02%, well below average.

And the new study's authors also credited institutions for policies that mitigated the spread of COVID-19. Each of the 30 campuses in the study pursued regular surveillance testing once or twice a week, as well as aggressive strategies to test, trace and isolate.

That method will be "critical" to ensure safe reopenings for campuses following the winter break, Kuhl said, as will limiting the virus at the beginning of the term and compliance with local regulations, especially those regarding social isolation and quarantining.

The University of North Carolina at Chapel Hill is a case study in another crucial element: a flexible transition to online instruction. After starting classes primarily in person Aug. 10, the university reported 177 positive cases before moving all undergraduate classes online Aug. 17. By Sept. 2, the study notes, new case numbers were steadily below 10, demonstrating how, "The transition to online instruction is a successful strategy for outbreak control."

The relevance of the new research will likely extend even beyond the winter semester. Despite the emergence of vaccines, Kuhl does not expect things to be business as usual on campuses in the next academic year, even as institutions begin to look toward getting back to a more normal course. The University of California said Monday that students should plan to return for mostly in-person classes this fall.

“Even if you vaccinate a lot of students, even if many of them have had the disease and are thought to be immune, I don’t see, really, the fall quarter of 2021 — so in nine months from now — people walking around without masks, for instance,” Kuhl said. “After the summer I think most colleges are confident that they can bring students back ... but then this high reproduction number will still be there.”

More immediately, Kuhl said, while many colleges have decided not to bring students back for the winter, “Some might, so I think it’s probably a more current topic now than it was even in the summer.” Colleges on the quarter system will approach similar decisions regarding the spring term around March.

The study of 30 U.S. colleges and universities included only those that reported caseloads on a daily basis and experienced at least 100 cases overall. The sample included 10 institutions with the highest numbers, nine of which were public, as well as 10 public and as many private institutions at the top of the U.S. News & World Report rankings. The colleges operated under a mix of in-person, online and hybrid learning.

*The study “Are college campuses superspreaders? A data-driven modeling study,” published Jan. 13 in Computer Methods in Biomechanics and Biomedical Engineering, was authored by Hannah Lu, Cortney Weintz, Joseph Pace, Dhiraj Indana, Kevin Linka and Ellen Kuhl, Stanford University.*