

Study shows COVID-19 vaccines offer lasting protection

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Vaccination offers long-lasting protection from the worst outcomes of COVID-19, according to a new study by the University of North

Carolina at Chapel Hill.

The emergence of the delta and omicron variants has raised questions about whether [breakthrough infections](#) are caused by waning immunity or by the more transmissible variants.

Results of the study published in the *New England Journal of Medicine* suggest that declining immunity is responsible for breakthrough infections, but vaccines maintained protection from hospitalization and severe disease nine months after getting the first shot.

"The primary takeaway message from our study is that unvaccinated people should get vaccinated right away," said lead study author Danyu Lin, Ph.D., Dennis Gillings Distinguished Professor of Biostatistics at the UNC Gillings School of Global Public Health. "The results of our study also underscore the importance of booster shots, especially for [older adults](#)."

The study, which is a collaboration between the UNC-Chapel Hill and the North Carolina Department of Health and Human Services, examined data on COVID-19 vaccination history and health outcomes for 10.6 million North Carolina residents between December 2020 and September 2021.

The study results were used by the Centers for Disease Control and Prevention to [support](#) the use of booster shots.

"This is an excellent example of the wonderful research partnership between the Gillings School and NCDHHS, who are working together to generate the evidence base needed to keep our communities safe," said Penny Gordon-Larsen, Ph.D., Carla Smith Chamblee Distinguished Professor of Global Nutrition and associate dean for research at UNC Gillings School of Global Public Health

This data included outcomes from COVID-19 cases caused by the delta variant. However, data from this study were collected before the discovery of the omicron variant.

"By applying a novel methodology to the rich surveillance data, we were able to provide precise and comprehensive characterization of the effectiveness over a nine-month period for the three vaccines employed in the U.S.," Lin said.

"Unlike previous studies, we estimated the [vaccine effectiveness](#) in reducing the current risks of COVID-19, hospitalization and death as a function of time elapsed since the first dose," Lin continued. "This information is critically important in determining the need for and the optimal timing of booster vaccination."

The study found that effectiveness of the Pfizer and Moderna mRNA vaccines in reducing the risk of COVID-19 reached a peak of about 95% at two months after the first dose and then gradually declined. At seven months, the Pfizer [vaccine](#) dropped to 67% effectiveness, compared to the Moderna vaccine, which maintained 80% effectiveness.

Among early recipients of the two mRNA vaccines, effectiveness dropped dramatically from mid-June to mid-July, when the delta variant was surging.

Effectiveness for the Johnson & Johnson adenovirus vaccine was 75% at one month after injection and fell to 60% after five months.

All three vaccines were effective at keeping people out of the hospital due to severe COVID-19. Effectiveness of the Pfizer vaccine reached a peak of 96% at two months and remained around 90% at seven months; effectiveness of the Moderna vaccine reached a peak of 97% at two months and remained at 94% at seven months. Effectiveness of the

Johnson & Johnson vaccine reached a peak of 86% at two months and was higher than 80% through six months.

For all three vaccines, effectiveness against death was higher than that of hospitalization.

"Because the majority of the vaccines in the U.S. were administered more than seven months ago and only a small percentage of the population has received boosters, waning immunity is likely contributing to the breakthrough infections with the omicron variant," Lin said.

Everyone age 5 and older is eligible for a COVID-19 vaccine. Those ages 18 and up should get a booster shot. [Visit](#) the NC DHHS website to find a vaccination clinic near you.

More information: Effectiveness of COVID-19 vaccines over a 9-month period in North Carolina, *New England Journal of Medicine* (2022).

Provided by University of North Carolina at Chapel Hill

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