

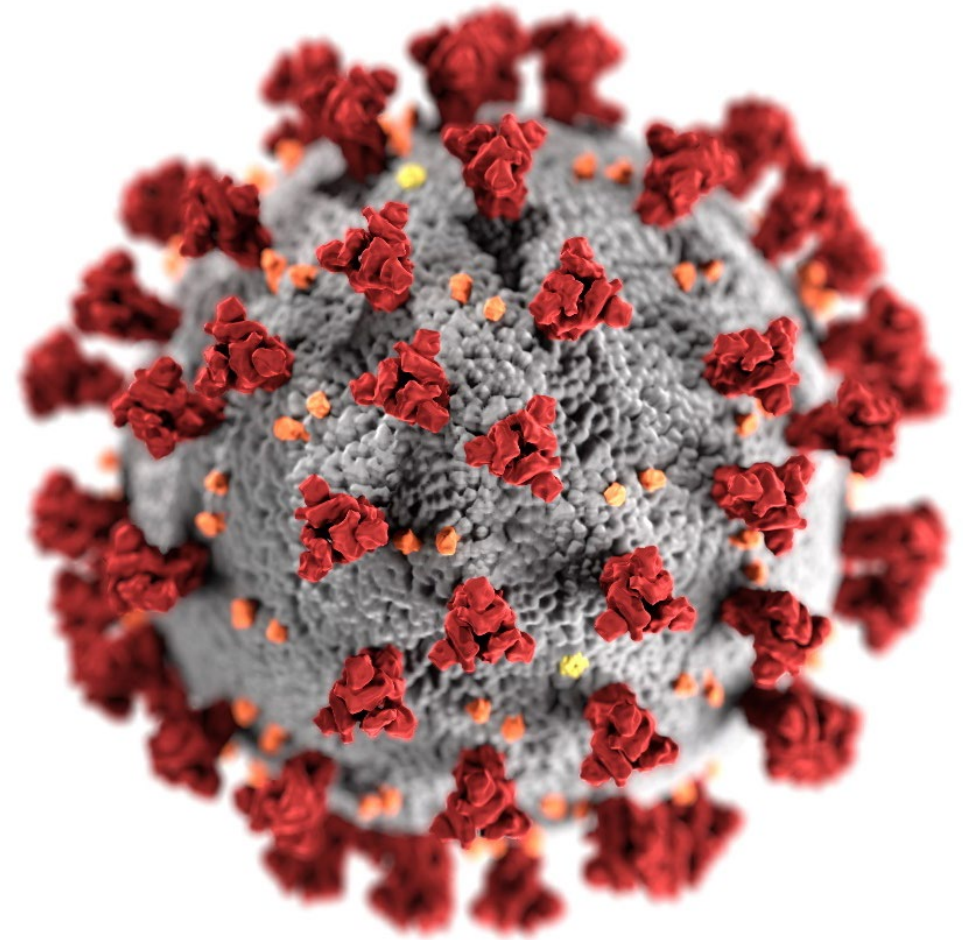
## **Vaccines and Related Biological Products Advisory Committee Meeting**

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# COVID-19 vaccine coverage & effectiveness during Omicron for children and adolescents

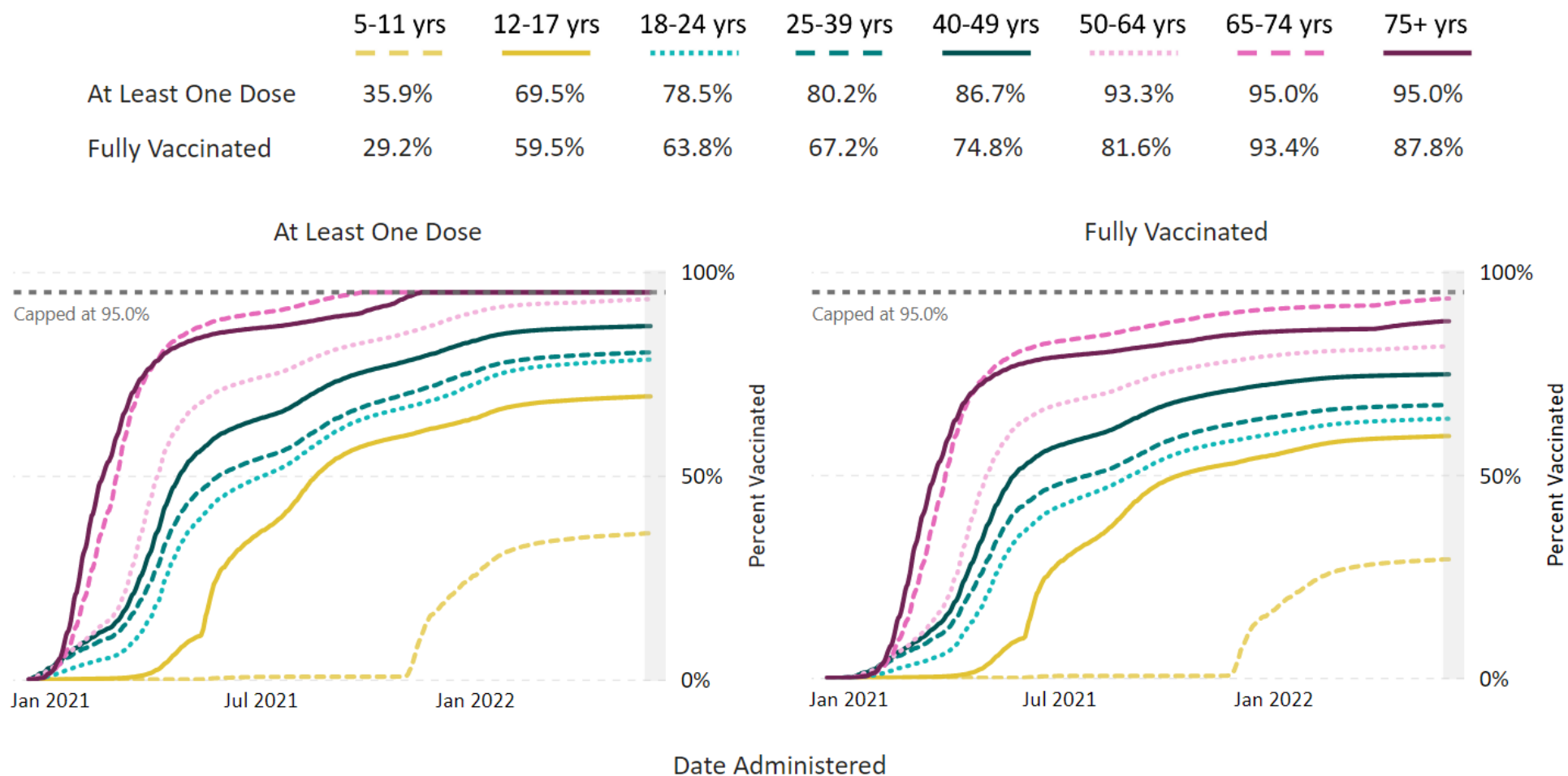
Ruth Link-Gelles, PhD, MPH  
LCDR, US Public Health Service  
Program Lead, COVID-19 Vaccine Effectiveness  
Epidemiology Task Force, CDC

VRBPAC  
June 14, 2022



[cdc.gov/coronavirus](https://cdc.gov/coronavirus)

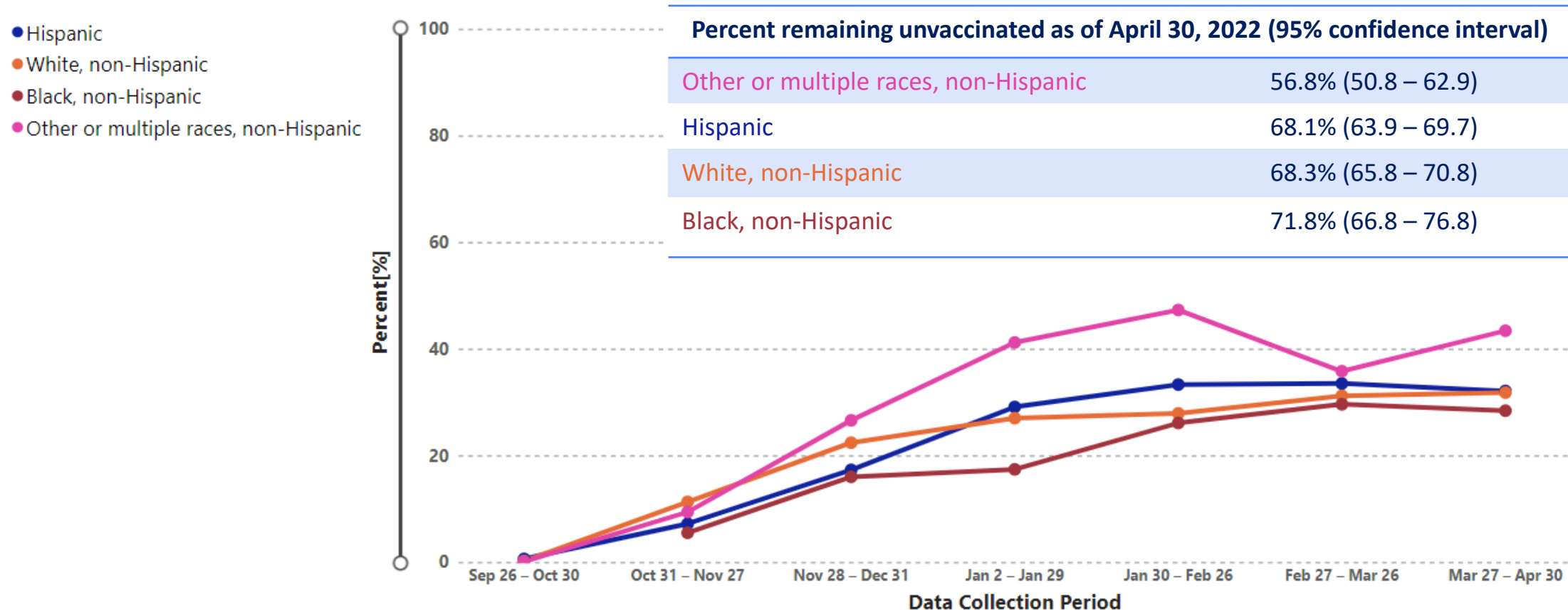
# Percentage of persons of all ages who received at least one dose of the COVID-19 vaccine over time, United States, December 14, 2020–June 1, 2022



People fully vaccinated: total count represents the number of people who have received a dose of a single-shot COVID-19 vaccine or the second dose in a 2-dose COVID-19 vaccine series. The grey shaded area represents the last 5 days, for which data may lag.

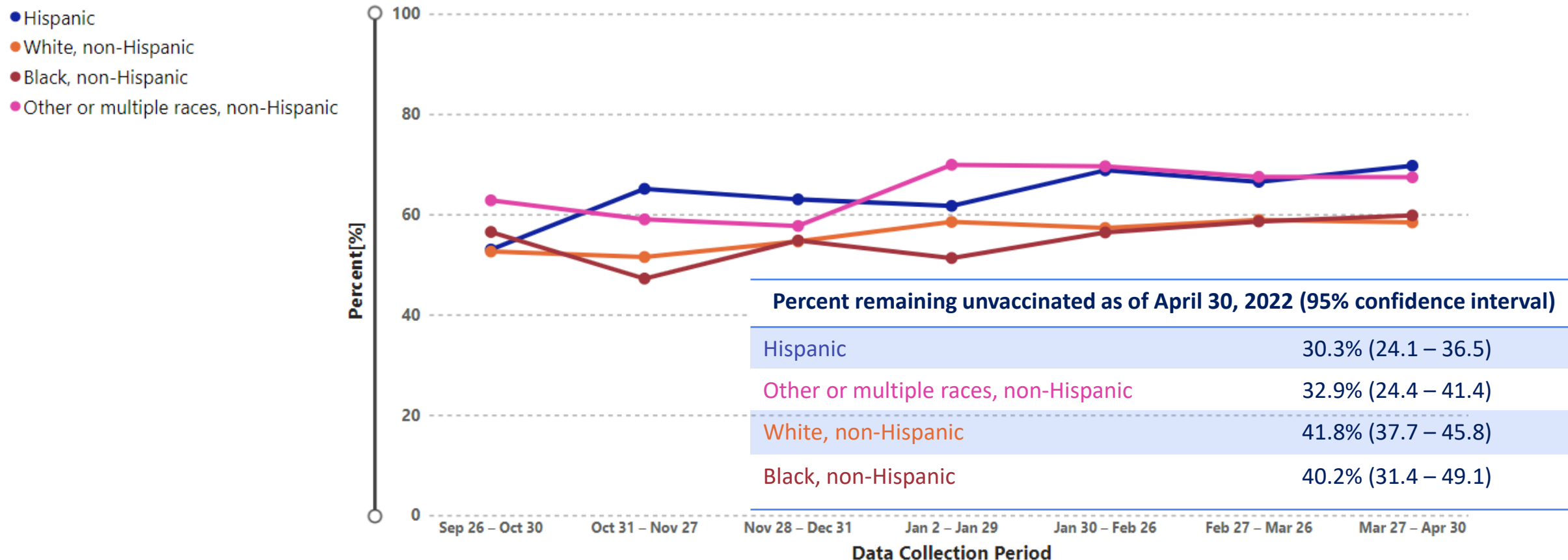
CDC COVID Data Tracker. <https://covid.cdc.gov/covid-data-tracker/#vaccination-demographics-trends> Accessed June 2, 2022

# Monthly percent of children ages 5–11 years with at least 1 COVID-19 vaccine dose, by race and ethnicity, September 26, 2021–April 30, 2022



Source: Estimates produced by NORC at the University of Chicago using CDC's National Immunization Survey-Adult COVID-19 Module (NIS-ACM). [COVID-19 Vaccination Coverage and Vaccine Confidence Among Children | CDC](#). Accessed June 2, 2022.

# Monthly percent of adolescents ages 12–17 years with at least 1 COVID-19 vaccine dose, by race and ethnicity, September 26, 2021–April 30, 2022



Source: Estimates produced by NORC at the University of Chicago using CDC's National Immunization Survey-Adult COVID-19 Module (NIS-ACM). [COVID-19 Vaccination Coverage and Vaccine Confidence Among Children | CDC](#). Accessed June 2, 2022.

# COVID-19 Vaccine Effectiveness

# Pediatric Research Observing Trends and Exposures in COVID-19 Timelines (PROTECT)

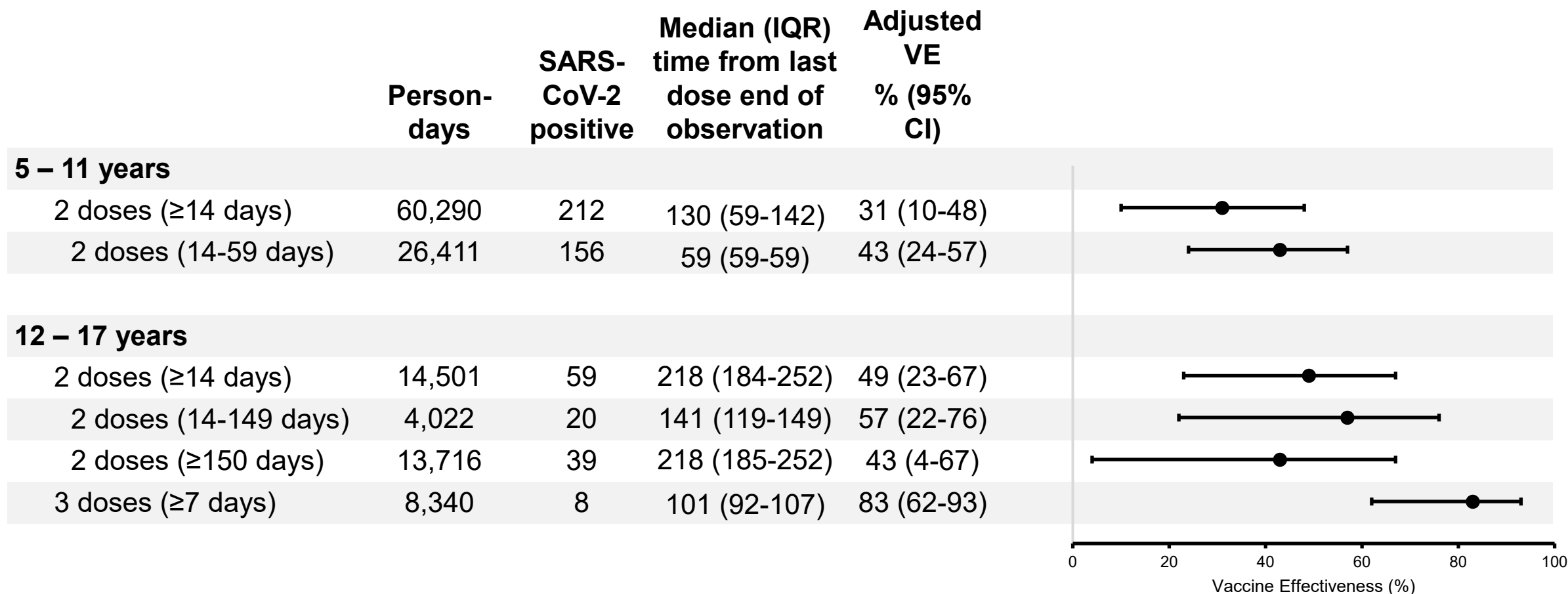
- **Design:** Prospective cohort study
- **Population:** Children ages 4 months – 17 years
- **Methods:** Weekly surveillance and self-swab
  - SARS-CoV-2 testing by RT-PCR and whole genome sequencing
  - Electronic surveys during and after SARS-CoV-2 infection
  - Multi-method vaccination documentation
- **Analysis:** Cox proportional hazards model adjusted by propensity to be vaccinated, site, SARS-CoV-2 circulation, and community mask use
  - Timeframe for analysis during local Omicron predominance
    - December 14, 2021 – April 23, 2022



Recruitment includes children of adult participants in a similar study (HEROES-RECOVER) of frontline workers and from the local community



# PROTECT: VE against SARS-CoV-2 infection by age group during Omicron variant predominance, mid-Dec 2021-Apr 2022



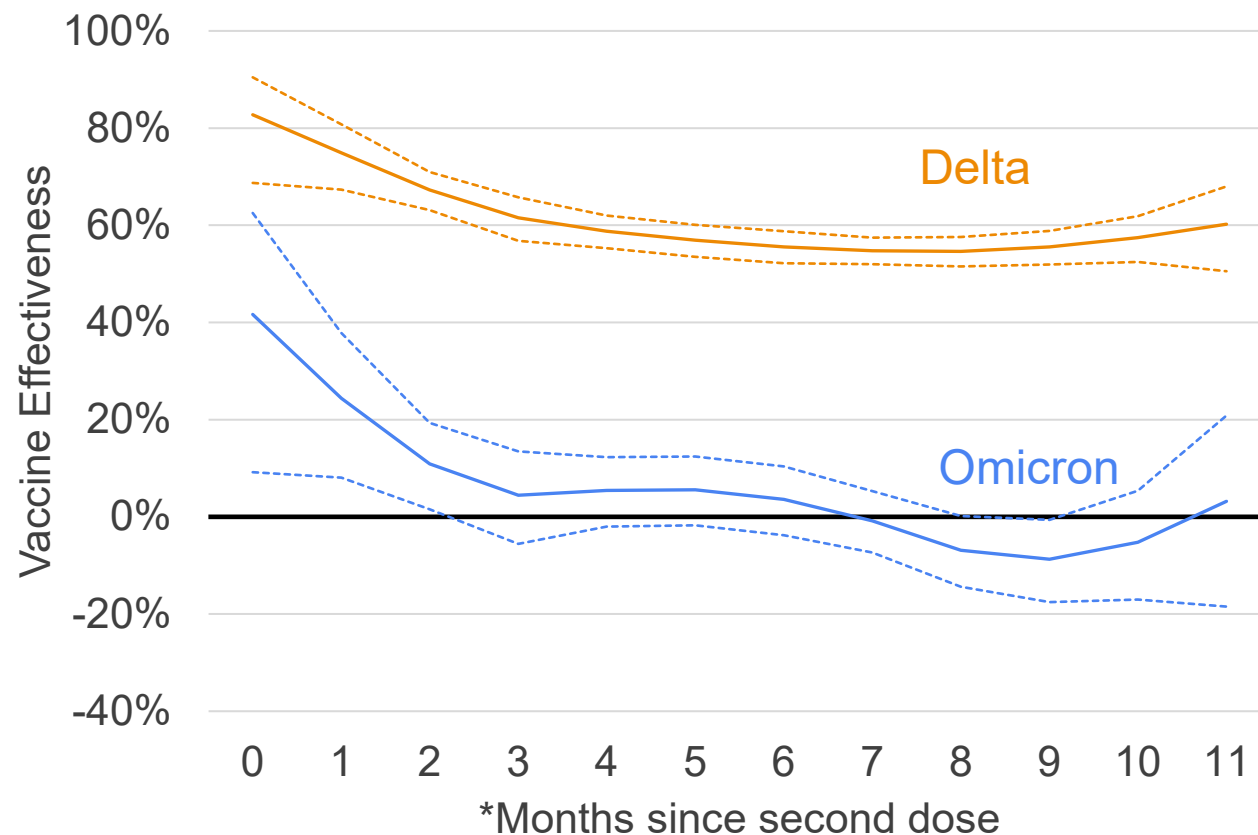


# Increasing Community Access to Testing (ICATT)

## Partnership: VE analysis for symptomatic infection

- Nationwide community-based drive-through COVID-19 testing via pharmacies
- Self-reported vaccine history at time of registration for COVID-19 testing; excluded those who did not report vaccination status
- **Design:** Test-negative, case-control analysis
- **Population:** Persons with  $\geq 1$  COVID-like symptom and nucleic acid amplification testing (NAAT)
- **Adjusted for:**
  - Calendar day, race, ethnicity, gender, site's HHS region, site census tract's social vulnerability index (SVI)
- **Period for Omicron analysis:**
  - **Adults:** Tested December 10, 2021 – January 1, 2022, also adjusted for number of underlying conditions and tests, excluded if prior positive test within 90 days (Omicron defined by s-gene target failure)
  - **Children:** Tested March 11-May 31, 2022 (mix of BA1, BA2, and BA2.12.2)

## ICATT: Pfizer-BioNTech 2-dose VE against symptomatic infection by variant and time since 2<sup>nd</sup> dose receipt, adults ages ≥18 years, Dec 10, 2021–Jan 1, 2022



- VE against symptomatic Omicron compared to Delta variant over time since 2<sup>nd</sup> dose:

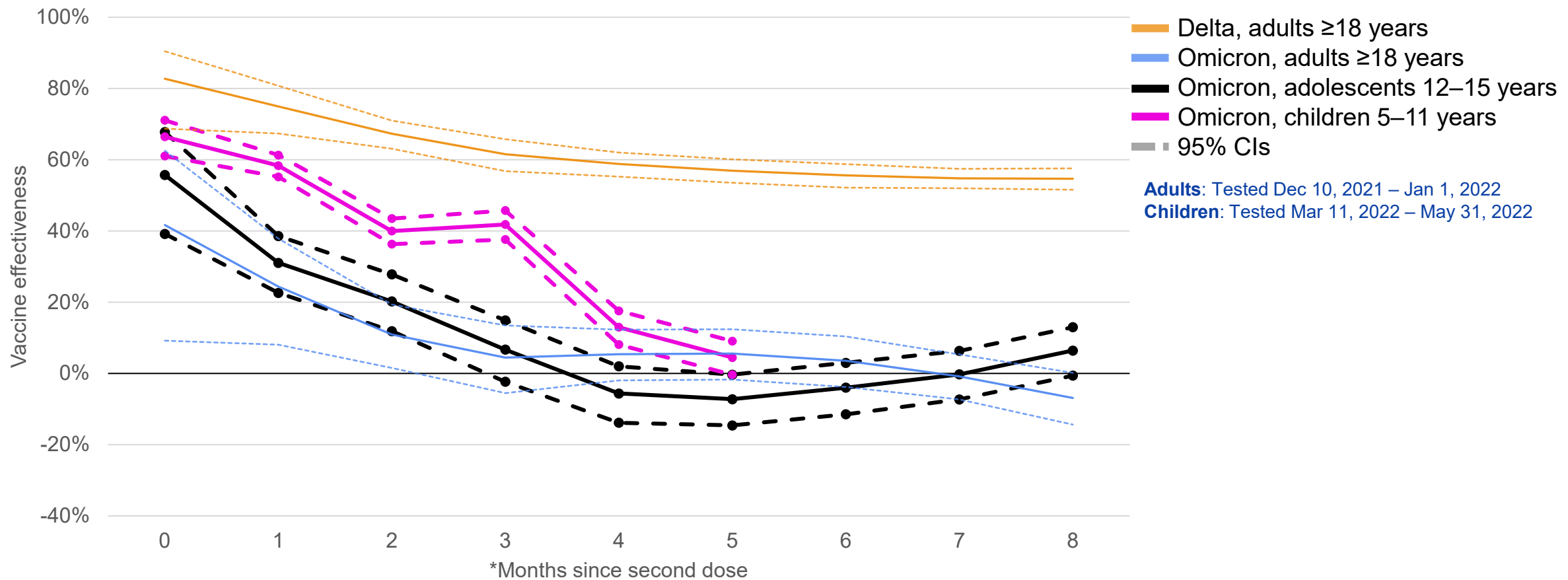
- Baseline is lower
- No longer significant by 3 months

- VE for Delta
- 95% CI for Delta
- VE for Omicron
- 95% CI for Omicron

\*Vaccination dose dates are collected as month and year. Month 0 represents tests in the same month as 2<sup>nd</sup> dose (at least 2 weeks after 2<sup>nd</sup> dose). For all months greater than or equal to 1 the value represents the difference between calendar month of test and calendar month of 2<sup>nd</sup> dose receipt (at least 2 weeks after 2<sup>nd</sup> dose).

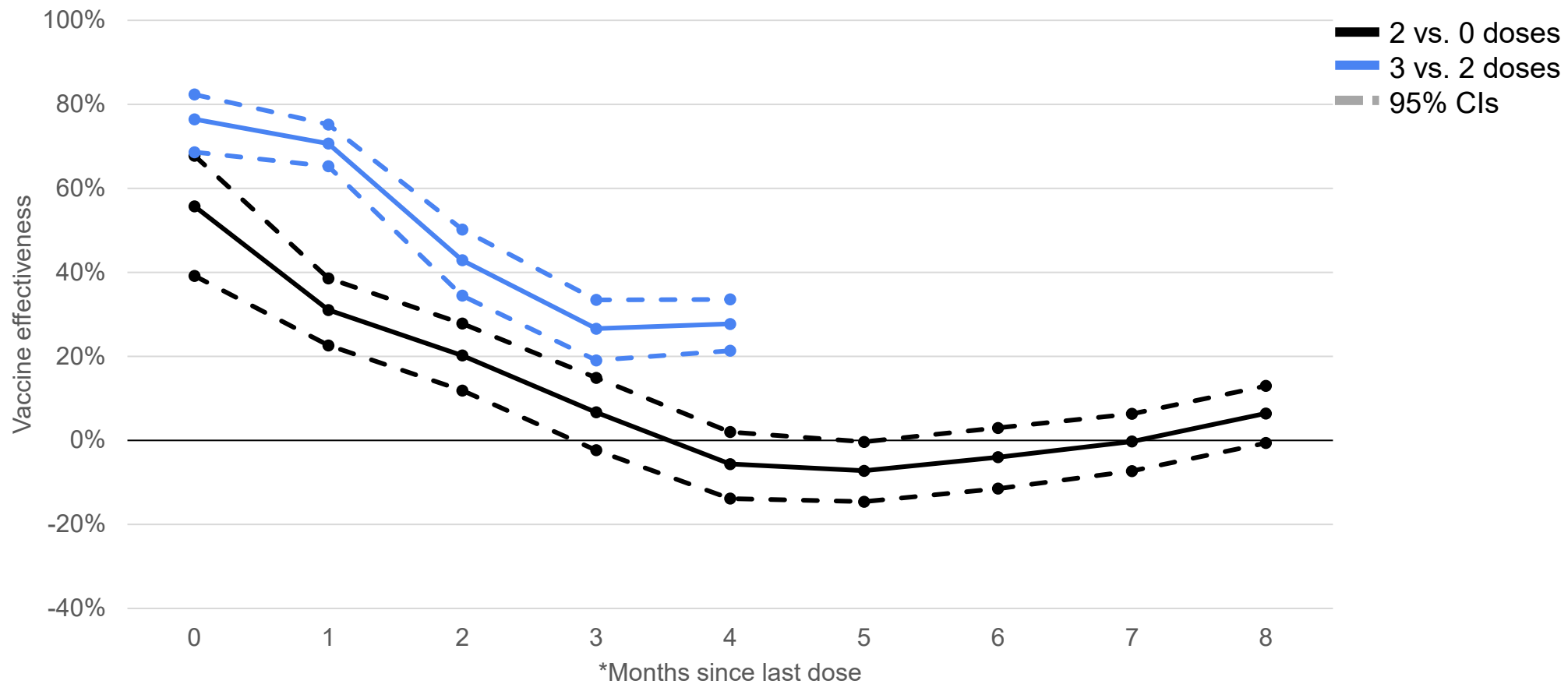
Accorsi EK, Britton A, Fleming-Dutra KE, et al. Association Between 3 Doses of mRNA COVID-19 Vaccine and Symptomatic Infection Caused by the SARS-CoV-2 Omicron and Delta Variants. JAMA. 2022;327(7):639–651. doi:10.1001/jama.2022.0470

# ICATT: Pfizer-BioNTech 2-dose VE against symptomatic infection, by age group and variant



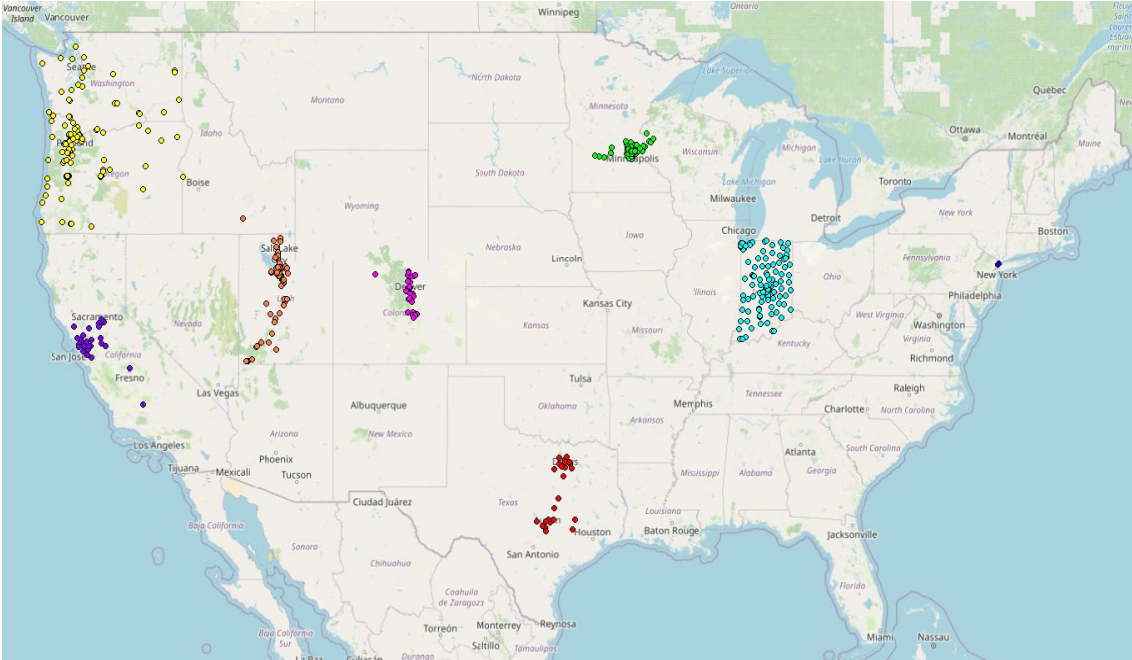
\*Vaccination dose dates are collected as month and year. Month 0 represents tests in the same month as 2<sup>nd</sup> dose (at least 2 weeks after 2<sup>nd</sup> dose). For all months greater than or equal to 1 the value represents the difference between calendar month of test and calendar month of 2<sup>nd</sup> dose receipt (at least 2 weeks after 2<sup>nd</sup> dose).

# ICATT: Pfizer-BioNTech 3 vs. 2-dose relative VE against symptomatic infection, age 12-15 years



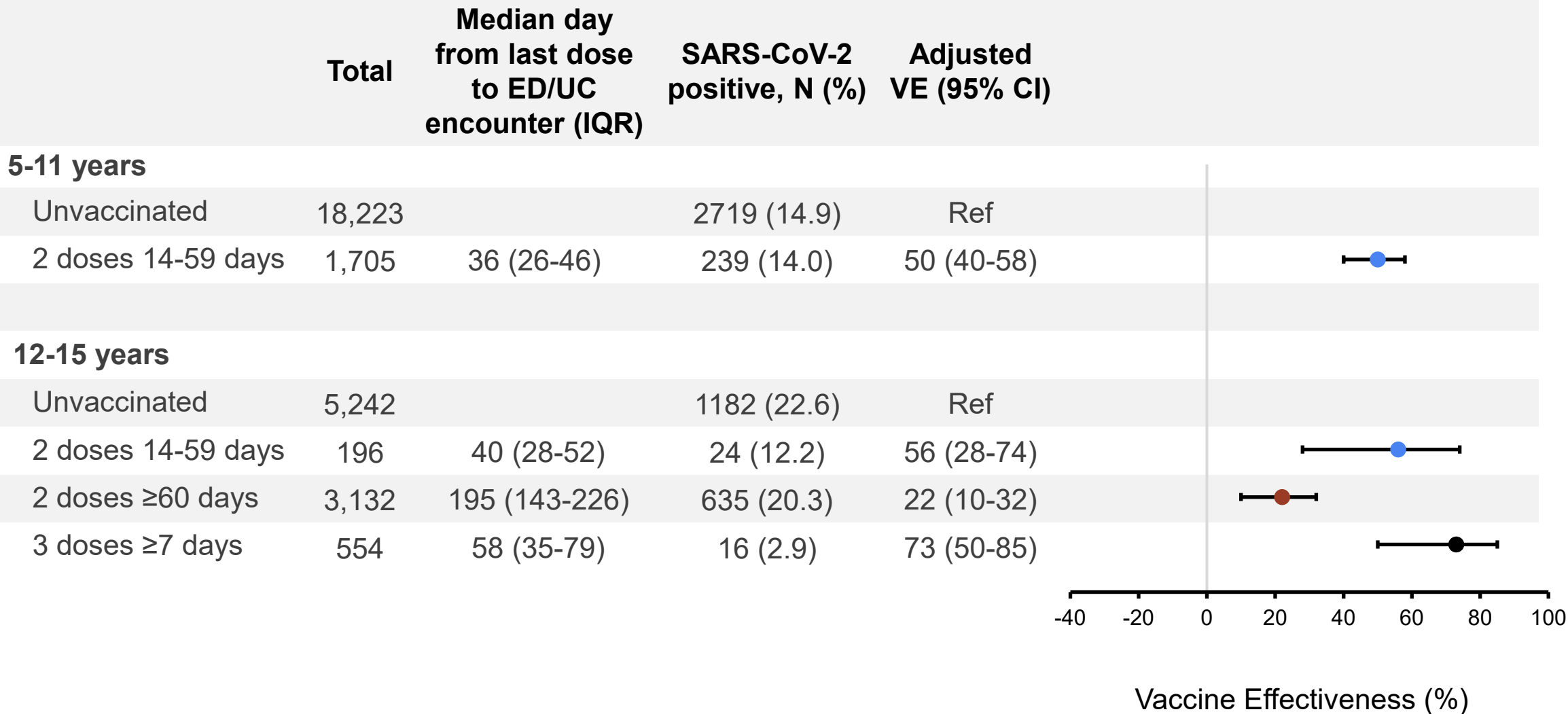
\*Vaccination dose dates are collected as month and year. Month 0 represents tests in the same month as 2<sup>nd</sup> dose (at least 2 weeks after 2<sup>nd</sup> dose). For all months greater than or equal to 1 the value represents the difference between calendar month of test and calendar month of 2<sup>nd</sup> dose receipt (at least 2 weeks after 2<sup>nd</sup> dose).

# VISION Multi-State Network of Electronic Health Records



- **Cases:** COVID-like illness (CLI) with positive PCR for SARS-CoV-2 within 14 days before or 72 hours after the admission or encounter
- **Controls:** CLI with negative PCR for SARS-CoV-2
- Vaccination documented by electronic health records and state and city registries

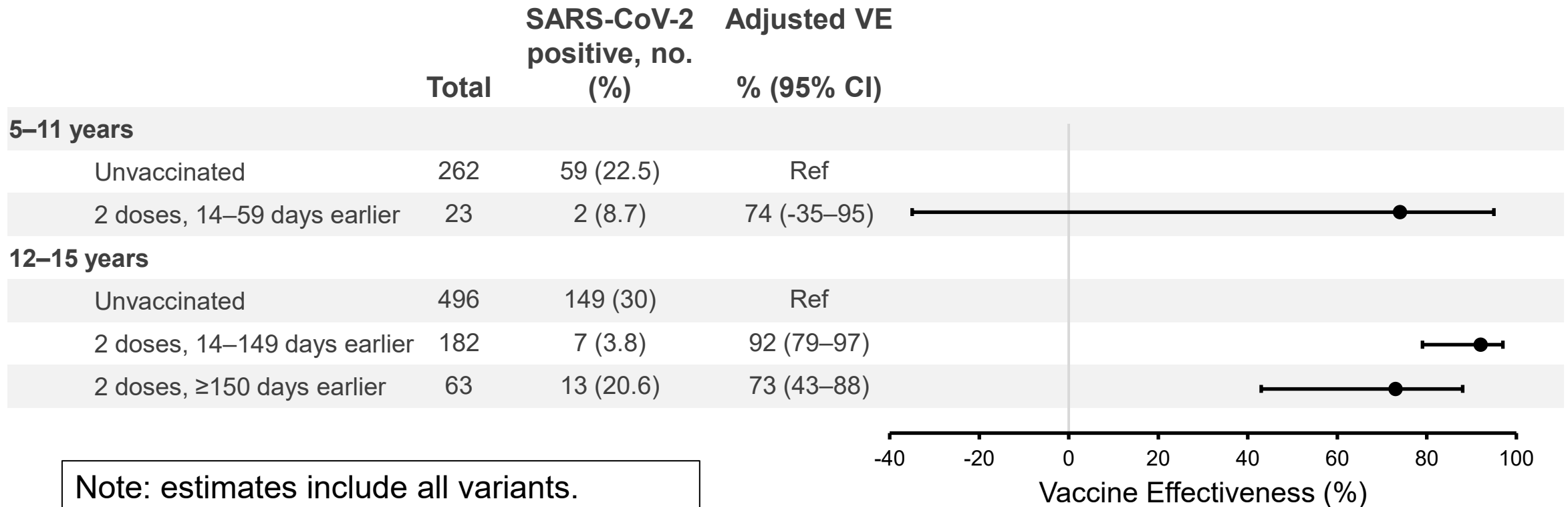
# VISION: mRNA VE for ED/UC visits by number of doses and time since last dose receipt for children and adolescents during Omicron, mid-Dec 2021–mid-May 2022



CDC, preliminary unpublished data. Individuals with prior infections excluded. Adjusted for calendar time, geographic region, age, sex, race, ethnicity, local virus circulation, respiratory or non-respiratory underlying medical conditions, and propensity to be vaccinated

COVID-like illness: included acute respiratory illness (e.g., COVID-19, respiratory failure, or pneumonia) or related signs or symptoms (cough, fever, dyspnea, vomiting, or diarrhea)

# VISION: mRNA VE against hospitalization, all variants, ages 5-15 years, Apr 9, 2021-Jan 29, 2022



Note: estimates include all variants.

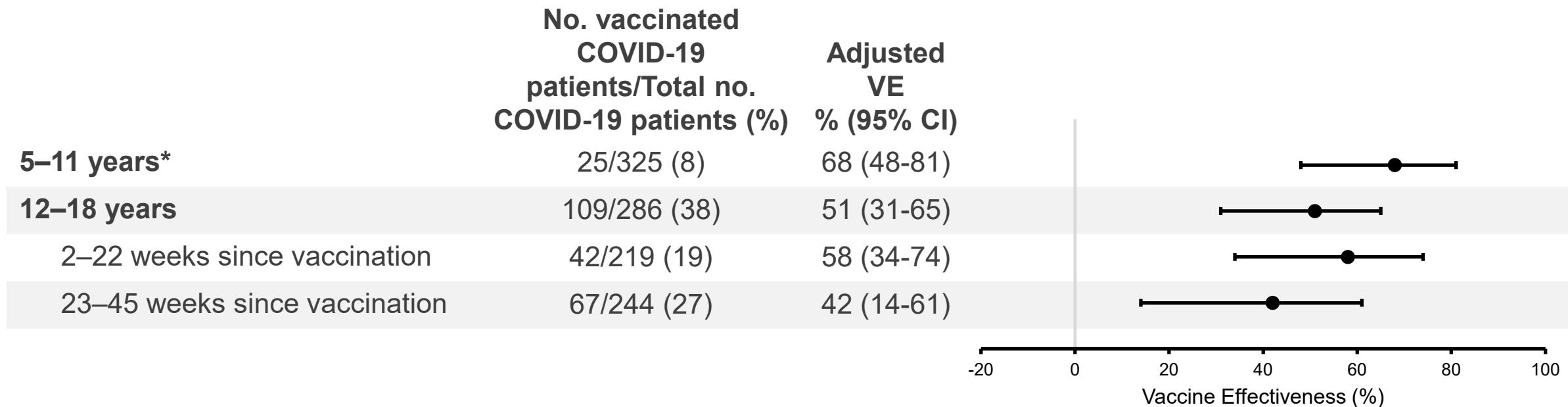
- 5–11 years: 190 (67%) due to Omicron
- 12–15 years: 111 (15%) due to Omicron



# Overcoming COVID-19 Methods

- **Design:** Case-control test-negative design
- **Population:** Children and adolescents hospitalized at 31 pediatric medical centers in 23 U.S. states
- **Case status (RT-PCR or antigen)**
  - Cases tested SARS-CoV-2 positive
  - Controls tested SARS-CoV-2 negative
- **Vaccination status (documented or plausible self-report)**
  - Fully vaccinated with Pfizer-BioNTech vaccine (dose 2 is  $\geq 14$  days prior to illness onset)
  - Or unvaccinated by illness onset
- **Logistic regression to estimate VE against hospitalization ( $VE_s$ )**
  - Comparing odds of being fully vaccinated vs unvaccinated in COVID-19 cases and controls
  - $VE_s = 100 \times (1 - \text{adjusted odds ratio})$ 
    - Adjusting for admission date, hospital region, age, sex, race/ethnicity

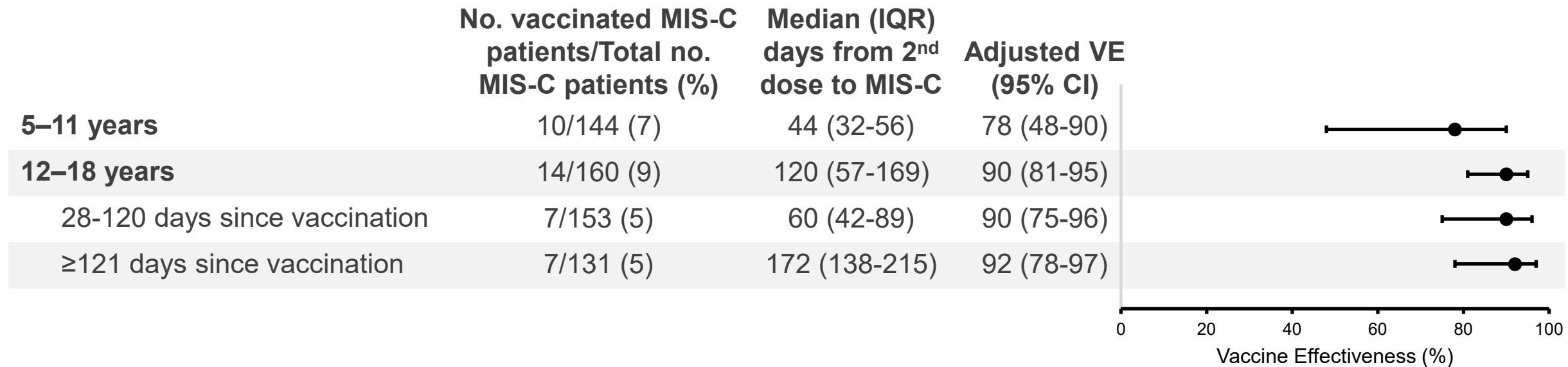
# Overcoming COVID-19 platform: VE for 2 doses of Pfizer-BioNTech vaccine against hospitalization, Dec 19, 2021-Apr 27, 2022



\*median time from vaccination to hospitalization is 37 days

CDC preliminary unpublished data. Methods from: Price AM, Olson SM, Newhams MM, Halasa NB, Boom JA, Sahni LC, Pannaraj PS, Irby K, Blinne KE, Maddux AB, Nofziger RA, Cameron MA, Walker TC, Schwartz SP, Mack EH, Smallcomb L, Schuster JE, Hobbs CV, Kamidani S, Tarquinio KM, Bradford TT, Levy ER, Chiotos K, Bhumbra SS, Cvijanovich NZ, Heidemann SM, Cullimore ML, Gertz SJ, Coates BM, Staat MA, Zinter MS, Kong M, Chatani BM, Hume JR, Typpo KV, Maamari M, Flori HR, Tenforde MW, Zambrano LD, Campbell AP, Patel MM, Randolph AG; Overcoming Covid-19 Investigators. BNT162b2 Protection against the Omicron Variant in Children and Adolescents. N Engl J Med. 2022 Mar 30. doi: 10.1056/NEJMoa2202826. Epub ahead of print. PMID: 35353976.

# Overcoming COVID-19 platform: VE for 2 doses of Pfizer-BioNTech vaccine against MIS-C, Jul 1, 2021-Apr 7, 2022



# Summary

## ■ Coverage

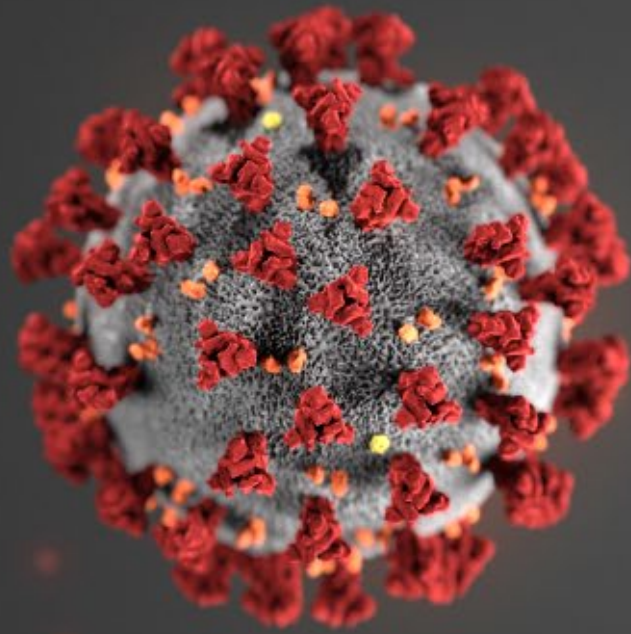
- Coverage among adolescents and children has remained lower than among adults and differs somewhat by race/ethnicity

## ■ Vaccine effectiveness

- Infection
  - 2-dose VE declines quickly in children and adolescents, following similar pattern to adults during Omicron predominance
  - A booster dose in adolescents significantly improved VE initially, although there was waning
- Emergency department/urgent care visits
  - 2-dose VE was higher for ED/UC visits compared to infection.
    - › Declined  $\geq 60$  days after the 2<sup>nd</sup> dose for both ages
  - A booster dose in ages 12-15 years significantly improved VE
- Severe disease: hospitalization and MIS-C
  - 2-doses provided protection for both age groups, with some waning for hospitalization in adolescents
  - High VE in both age groups against MIS-C
  - Not enough data to assess waning in 5-11 or impact of booster dose in 12-15

# Acknowledgements

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  - Laura Zambrano



For more information, contact CDC  
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TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

