

WEB MATERIAL

Waning of 2-dose BNT162b2 and mRNA-1273 vaccine effectiveness against symptomatic SARS-CoV-2 infection is robust to depletion-of-susceptibles bias

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Web Appendix. Survey Questionnaire

SECTION 1: INTRODUCTION (~2 min)

1. Hello, my name is [____] and I am calling on behalf of California Department of Public Health to ask some questions regarding [NAME]'s recent COVID-19 test on [INSERT DATE OF TEST].
2. Make sure you're on the phone with the correct person.

If case is a child under 18y, make sure you are speaking to a parent/ guardian:

2a. Am I speaking to [NAME]'s parent or guardian?

[If yes, proceed to [section 2](#)]

[If no, proceed to 2b]

2b. Can you please pass the phone to [NAME]'s parent or guardian?

[If yes, proceed to [section 2](#)]

[If no, end call]

If case is someone older than 18y:

2c. Am I speaking to [NAME]?

[If yes, proceed to [section 2](#)]

[If no, proceed to 2d]

2d. Can you please pass the phone to [NAME]?

[If yes, proceed to [section 2](#)]

[If no- end call]

NOTE on proxy respondents:

If an individual is hospitalized or otherwise too sick to answer questions on their own behalf, a caretaker may serve as a proxy respondent, but verbal consent must first be obtained from the primary case both to participate in the study and to have the proxy respondent answer on their behalf.

A proxy respondent who speaks English or Spanish may answer if the individual is unable to easily complete the interview in one of these two languages, provided they are able to speak English or Spanish with sufficient proficiency to provide verbal consent for both participation and for communicating via the proxy respondent.

SECTION 2: ASSENT (~1 min)

If you are speaking to a parent or correct person for the first time, add your name and affiliation before starting:

Hello, my name is [____] and I am calling on behalf of California Department of Public Health.

1. **Hi! We are interested in asking you some questions about [YOUR or INSERT CHILD'S NAME] recent COVID-19 test. We are hoping to interview you to try to better understand the spread of COVID-19. Do you have some time to chat?**

INTERVIEWER: pause and wait for person to confirm that they are still on the line, check YES if they say they are willing to chat

If they do not have time, select NO

2. **So before we start, I want to make sure you understand that everything I ask you is confidential, protected by California's strict privacy laws, and is only being used to inform public health. Your answers will not be shared with any other federal, state, or local authorities, and you're welcome to decline to answer any question. We anticipate this will take about 20 minutes. I know that sounds like a long time, but we really appreciate your time and your answers will help us answer some extremely important questions about COVID-19.**

Do you understand the information I have just shared with you? **INTERVIEWER:** check "yes" if the respondent answers yes and if you deem the respondent to be competent to proceed with consent and interviewing; check "no" and thank the respondent for their time if the respondent says no or if you deem the respondent is not competent to proceed with consent and interviewing.]

If it seems like the person needs a [proxy respondent](#) due to not speaking well enough English or being too sick,

you may ask "Is there anyone who can help you answer my questions?". If you get the proxy respondent on the phone, re-introduce yourself by starting at the top of Section 2 with "Hello, my name is..." and add at the end, "Can you help answer questions on [insert name of case/control's] behalf?"

NOTE that a proxy respondent must be over the age of 14.

Interviewers then seek consent from the participant, but the question asked will depend on the age of the desired case/control.

[If participant is answering on their own behalf AND they are older than 18]

Great, thank you! To confirm, are you willing to participate in this interview?

[If participant is a child older than 14, answering on their own behalf, first ask for consent from the parent for the child to answer the survey]

Great, thank you! I want to let you know that your child [INSERT CHILD'S NAME] may answer questions on their own behalf. Are you willing to allow [INSERT CHILD'S NAME] to participate in this interview? If not, you can answer questions on their behalf.

Interviewer: if the child older than 14 joins the call, make sure to reintroduce yourself and explain the purpose of the survey.

[If participant is a child younger than 14, and adult is answering on their behalf]

Great, thank you! Are you willing to answer questions about [INSERT CHILD'S NAME]'s recent exposures as part of this interview?

[If a proxy respondent will answer on behalf of the study participant]

If you are able, I would suggest putting the phone on speakerphone during this interview, so [insert name/relationship of proxy respondent] can help you.

[INSERT NAME OF CASE-CONTROL], are you willing to participate in this interview?

[INSERT NAME OF CASE-CONTROL], do you consent to allow [NAME OF PROXY RESPONDENT] to answer my questions during this interview. Please stay close by [NAME OF PROXY RESPONDENT] in case it is necessary to clarify any points that come up.

[If no or asks to be called back later, proceed to end of the survey]

[If consent is provided and case/control is 7-18 years old, proceed to 3]

Interviewer: select the following options based off of the consent pattern:

- Participant provided consent on their own behalf
- Parent provided consent for child <18 yrs
- Participant provided consent for proxy respondent to answer on their own behalf
- No consent was provided

3. No problem. But before we hang up, do you mind quickly sharing why you are unable or unwilling to complete this call? Record the free response

[End call]

4. [INSERT CHILD'S NAME] is welcome to stand by or join the call to help answer questions.

[If child joins the call, proceed to 3b, otherwise skip to [section 3](#)]

3b. Hi [INSERT CHILD'S NAME]. My name is [____] and I work with the California Department of Public Health. I'm going to ask you some questions about activities in the past couple of weeks. Are you willing to answer these questions so that we can better understand the spread of COVID-19?

[Proceed to [section 3](#)]

SECTION 3: LAST COVID TEST (~3 min)

1. Great, so to start, I want to ask whether you know your COVID-19 test result from [INSERT DATE OF TEST]?

Record whether they know or don't know their test result by selecting on of the options:

- Subject knows test result and is positive
- Subject knows test result and is negative

- Subject does NOT know test result and is positive
- Subject does NOT know test result and is negative

[If yes and they are positive, proceed to [section 4](#)]

[If yes and they are negative, proceed to 3]

[If no, and they are negative, proceed to 2]

[If no, and they are positive, proceed to 4]

2. Your COVID-19 test result from [INSERT DATE OF TEST] has come back negative.

Record one of the following options:

- Yes
- No
- Don't know
- Refuse

[Proceed to 3]

3. Have you ever received a *positive* COVID-19 test result or been told by a health care provider that you are positive for COVID-19?

[If no, proceed to [section 4](#)]

[If yes, end-call saying: Thanks for letting me know. Those are all the questions I have for you.

Thank you for your time and I hope you have a nice day.

4. Your COVID-19 test result from [INSERT DATE OF TEST] has come back positive. This means you do have coronavirus disease or COVID-19. In my role with CDPH, I cannot provide you with medical advice. If you need any medical information, please call your healthcare provider. One thing I want to be sure of today is that we have a plan for you to follow up with your healthcare provider, so that they can check on any symptoms you may have and assess your risks. Even if you feel okay now, it is important to have someone you can call if you start feeling sick. If you do not have a healthcare provider, you can go to an urgent care facility or the emergency room if you are not getting better or you feel like you are getting worse.

[Proceed to [section 4](#)]

[If the person brings up clinical questions or concerns about their positive test]

Thank you for sharing that concern. In my role with CDPH, I am not able to give you medical advice. I do want to be sure that you get the help you need. If you believe you are having a medical emergency, you should call 911. Some warning signs that you should go to the emergency room for are: trouble breathing, bluish lips or face, pain or pressure in the chest that does not go away, new confusion or trouble waking or staying awake, but there are other symptoms too. Otherwise, you should call your healthcare provider.

SECTION 4: REASONS FOR TESTING (~3 min)

1. Next, I'm going to ask you some questions about your COVID-19 test. Can you describe to me why did you choose to get tested on [INSERT DATE OF TEST]?

Interviewers will select check boxes from the respondent based off of their response, without prompting them from the following list, and will use a write-in option for any additional reasons for seeking testing. After choosing the best answer from the list, confirm your choice the case/control (ex. "So you got tested for pre or post-travel screening?")

- I had contact with someone who tested positive
- I had contact with someone who had symptoms, but I do not know if they were confirmed to be positive
- I was told by a public health worker to get tested because I was exposed to a case
- I was concerned about symptoms I experienced
- Someone in my household had contact with someone who was positive
- A person in my household had contact with someone who had symptoms or suspected they had COVID, but we do not know if they are confirmed to be positive.
- Routine screening for my job
- Pre or post-travel screening
- Test required for a medical procedure
- I just wanted to see if I was infected
- Don't know
- Refuse
- Other [interviewer writes in response]

2. **At the time you were tested on [DATE OF TEST] were you experiencing any COVID-19 symptoms?**
Record Yes/No/Not Sure/ Refuse
[\[If yes, ask question 4\]](#)
[\[If no, proceed to question 5\]](#)

3. **Can you please list the symptoms you were experiencing on or 14 days prior to your test on [DATE OF TEST]**
Interviewers will select the symptoms the individuals indicated that they were experiencing. When the respondent is done listing symptoms, the interviewer may prompt, “Are you sure those were all the symptoms you experienced?” and proceed to confirm absence of the 6 most common symptoms (as applicable), in a conversational manner: “No fever, no chills, no muscle pain, no loss of appetite, no shortness of breath, no cough?”

Select from the following list of symptoms:

- Blocked nose
- Chills
- Cough
- Chest pain
- Diarrhea
- Muscle pain
- Fever
- Headache
- Hoarseness
- Loss of appetite
- Loss of taste
- Loss of smell
- Myalgia (muscle pain)
- Nausea
- Runny nose
- Shortness of breath
- Sneezing
- Sore throat
- Stomach pain
- Sinus pain
- Sweating
- Swollen glands
- Tickle in throat
- Watery eyes
- Don't know
- Refuse
- Other

4. **I am now going to read a list of places you may have sought treatment or advice prior to your test on [DATE OF TEST]. After I read the following options, please answer “Yes” or “No”.**

Record Yes/No/ Not Sure/Refuse e for each of the options below

- **Did you seek care at an in-person appointment with your usual physician or healthcare provider**
- **Did you seek care at a telehealth visit or phone appointment with your usual physician or healthcare provider**
- **Did you seek care at an in-person visit to an urgent care clinic**
- **Did you seek care at an in-person visit to a healthcare provider at a retail pharmacy**
- **Did you visit the emergency room?**
- **Were you admitted to the hospital?**
- **And just to follow-up, where there any other forms of healthcare from which you sought treatment advice at the time you had your test on [Insert date of test](specify):_____**

5. **In the 14 days prior to your test (between ADD DATE to ADD DATE) do you know whether you had known or suspected contact with one or more people who may have tested positive for COVID-19?**

Select one of the following options

- Yes- contact with one person who was confirmed positive
- Yes- contact with more than one person who was confirmed positive
- Yes- contact with one person who I suspected was positive
- Yes- contact with more than one person who I suspected was positive
- No known or suspected contact with a positive case
- Not sure
- Refuse

[\[If case indicated they had KNOWN or SUSPECTED Contact, proceed to section 5, part A\],](#)
[\[If the case did not have known or suspected contact, proceed to section 6\]](#)

SECTION 5: CONTACT WITH KNOWN OR SUSPECTED CASE (~8 min)

[If case indicated they had KNOWN or SUSPECTED Contact , proceed to A]

[If case indicated they did NOT have known or suspected contact, proceed to [section 6](#)]

A. I'm going to now ask you some questions about the type of contact you had with the person (people) who may have had COVID-19. We are trying to understand sources of exposure and are hopeful that you are willing to answer the questions honestly, knowing that we aren't looking or expecting any sort of answer.

1. Was the known/ suspected contact someone who lives in your household?

if plural (contact with >1 person): Were any of the known/ suspected contact people who lives in your household

Record Yes, No, Don't know, Refuse

2. Did the known/ suspected contact occur indoors, outdoors, or both indoors and outdoors?

if plural (contact with >1 person): Did the known/suspected contacts occur indoors, outdoors, or both indoors and outdoors?

Record Indoors, Outdoors, Both indoors and outdoors , Unknown, or Refuse

3. In the 14 days prior to your test (between [ADD 14 DAYS – TEST DATE HERE] to [ADD TEST DATE]), what are the locations where you may have had contact with this person?

if plural: In the 14 days prior to your test (between [ADD 14 DAYS – TEST DATE HERE] to [ADD TEST DATE]), what are the locations where you may have had contact with these people)

Record the free response answer

4. I am now going to ask you about different precautions you may or may not have been able to take when you came into contact with the known or suspected positive case. Please answer "Yes, No or Not Sure" after each question:

Record Y/ N/ Not sure for each of the options below:

- **Did you come within 6 feet of this person, indoors?**
If plural: Did you come within 6 feet of any of these people, indoors?
- **Did you come within 6 feet of this person, outdoors?**
If plural: Did you come within 6 feet of any of these people, outdoors?
- **Did you have physical contact with this person, (ie. handshake, hug)?**
If plural: Did you have physical contact with any of these people (ie. handshake, hug)

5. Did you wear a mask the entire time, most of the time, some of the time, or none of the time that you interacted with this person?

If plural: Did you wear a mask the entire time, most of the time, some of the time, or none of the time that you interacted with these people?

Record which of the statements they agree with from below:

- I wore a mask the entire time I interacted with this (these) person(s)
- I wore a mask most of the time I interacted with this (these) person(s)
- I wore a mask some of the time I interacted with this (these) person(s)
- I did not wear a mask during this (these) interaction(s)
- Not sure
- Refuse

6. Did the person you had known or suspected contact with wear a mask the entire time, most of the time, some of the time, or none of the time when you interacted with them?

If plural: Did the people you had known or suspected contact with wear a mask all, most, some, or none of the time that you interacted with them

Record which of the statements they agree with from below:

- They wore a mask the entire time we interacted
- They wore a mask most of the time we interacted
- They wore a mask some of the time we interacted
- They did not wear a mask during this interaction
- Not sure
- Refuse

7. Did you spend more than 3 consecutive hours with this person in the 14 days prior to your test (between Date to Date).
If plural: Did you spend more than three consecutive hours with these people in the 14 days prior to your test (between Date to Date)
Record Yes/ No/ Don't know/ Refuse

[proceed to [section 6](#)]

SECTION 6: EXPOSURE WITH CONTACT KNOWN OR SUSPECTED CASE (~10 min)

Next, I want to learn about potential sources of exposure to COVID-19 in the 14 days before your last test: from [ADD 14 DAYS – TEST DATE HERE] to [ADD TEST DATE]. It may help you to pull up a calendar to remember what you were up to over the last two weeks. This chunk usually takes the longest, so thank you in advance for your time

Only read the following if they did not have known or suspected contact:

[We are trying to understand sources of exposure and are hopeful that you are willing to answer the questions honestly, knowing that we aren't looking or expecting any sort of answer.]

1. I am now going to ask you about a series of locations which you may have visited. After I announce each location, please tell me “Yes, No, or Not sure” to indicate whether you visited that location between [ADD 14 DAYS – TEST DATE HERE] to [ADD TEST DATE].

- First, did you attend a health appointment or health facility (other than where you got tested for COVID-19)
- Did you go grocery shopping?
- Now I am going to ask you about the times you went to restaurants. Did you go to any restaurants to pick up take-out or to eat at the restaurant? Record one of the following options: a) Dine-in (eat at restaurant) only, b) Take-out only, c) Both dining-in and take-out, d) Neither dine-in or take-out, e) Not sure, f) Refuse

If yes and take-out:

- How many times did you get take-out?
- Did you ever have to go inside the restaurant to either place or pick up your take-out order? Record one of the following options: a) Yes, I went inside the restaurant either to place or pick-up my order, b) No I did not go inside the restaurant either to place or pick-up my order, d) No I did not go inside the restaurant either to place or pick-up my order, but someone I went to the restaurant with had to go inside to place or pick-up the order, e) not sure, f) refuse

If yes and dine-in:

- How many times did you eat at an indoor restaurant?
- How many times did you eat at an outdoor restaurant?

[Skip the following question chunk about bars if respondent is under 21]

- Did you attend any bars, breweries, or wine bars?
*If yes, ask: Did you attend a bar, brewery or wine bar? Select all
For each of the places they indicated that they visited:*
- How many times did you attend a [bar/brewery/wine bar]?
- When you went to a (those) [bar(s)/brewery(ies)/wine bar(s)], did you spend most of your time indoors, outdoors, or both indoors and outdoors?
- Did you ever visit a coffee shop? *If yes, ask:*
- When you (typically) visited the coffee shop(s), did you have to go inside to place your order? Record one of the following options: a) I went inside to place the order, b) I typically placed the order outside or remotely (via. App, web portal, phone order), c) Don't know, d) refuse
- When you visited a coffee shop, did you (typically) consume your beverage inside the shop, outside the shop, or did you just pick-up the beverage for take-away. Record one of the following options a) consumed inside the shop, b) consumed outside the shop (ex. restaurant set up outdoor tables/ chairs and I drank/ate at those tables), c) Got beverage for take-away, d) Don't know, e) refuse

- **Did you go retail shopping?**
If yes, ask: And did you go indoor or outdoor retail shopping?
- **Did you exercise at gym?**
If yes, ask: And was this an indoor or an outdoor gym?
- **Did you participate in a group recreational sport (tennis, soccer, basketball, swimming)**
- **Did you ever leave your house to go for a walk, run, hike or ride a bike outside?**
If yes ask: Did you hike, run, walk, or bike with anyone outside your household? Select one of the following options a) No, I always hiked, ran, walked, or biked by myself, b) No, but I sometimes/ always ran, walked, or biked with other people who live in my household, c) Yes I hiked ran, walked, or biked with someone who doesn't live in my household, d) Don't know, e) Refuse
- **Did you ride public transit?**
- **Did you use a ride share (eg. Taxi, Uber, Lyft, or carpool with individuals who are not members of your household) ?**
- **Did you fly on a plane?**
- **Did you attend a parade, rally, march, or protest?**
- **Did you receive services at a salon or barber?**
- **Did you attend an indoor movie theater?**
- **Did you attend a worship service?**
If yes ask: And was this an indoor or an outdoor worship service?
- **Did you visit or stay at a school, daycare or preschool?**
If yes, ask: Was the school or daycare public or private?
- **Did you visit a jail, prison, or correctional facility?**

If a participant answers yes to any of the questions in 1, follow-up with: How many times did you attend [INSERT LOCATION] between [ADD 14 DAYS – TEST DATE HERE] to [ADD TEST DATE].

I am now going to ask you (a couple more) some questions about face mask usage between date to date.

2. **Between [ADD 14 DAYS – TEST DATE HERE], at all of the indoor places we discussed earlier, did you wear a face mask all, most, some, or none of the time?**

- I wore a face mask all of the time
- I wore a face mask most of the time
- I wore a face mask some of the time
- I never wore a face mask in indoor places
- I did not go inside any indoor places other than my home
- I was not in contact with anyone

3. **Between [ADD 14 DAYS – TEST DATE HERE], at all of the indoor places we discussed earlier, did people you came within 6 feet of wear a face mask all, most, some, or none of the time?**

- They wore a face mask all of the time
- They wore a face mask most of the time
- They wore a face mask some of the time
- They never wore a face mask in indoor places
- I did not go inside any indoor places other than my home
- I was not in contact with any people outside my household in indoor places

4. **Between [ADD 14 DAYS – TEST DATE HERE], at all of the outdoor places we discussed earlier, did you wear a face mask all, most, some, or none of the time?**

- I wore a face mask all of the time
- I wore a face mask most of the time
- I wore a face mask some of the time
- I never wore a face mask in indoor places
- I did not go inside any outdoor places other than my home

5. **Between [ADD 14 DAYS – TEST DATE HERE], at all of the outdoor places we discussed earlier, did people you came within 6 feet of wear a face mask all, most, some, or none of the time?**

- They wore a face mask all of the time
- They wore a face mask most of the time
- They wore a face mask some of the time
- They never wore a face mask in indoor places
- I did not go inside any outdoor places other than my home
- I was not in contact with any people outside my household in outdoor places

6. **I am now going to ask you some questions about social gatherings. These include any informal gatherings with friends or family who are NOT members of your household). Did you attend any social gatherings between (14 days prior to test result to test result date)?**

Interviewer: note that our definition of social gatherings is mixing with people who don't otherwise live in your household. If someone had a longer-term family together (ie. traveled to visit relatives, but stayed for multiple days, count this as ONE event).

*If yes, ask: **When you attended social gatherings, were they indoors, outdoors, or both indoors and outdoors?***

An outdoor only gathering means the person spent the majority of their time outside

An indoor only gathering means the person spent the majority of their time

A gathering that was "both indoors and outdoors" means the participant was both inside and outside during the social gathering (ex. Sandy had some friends over for dinner and they ate outside on the patio, and then watched a movie in their living room together)

*If they indicate they attended indoor social gatherings: **How many indoor social gatherings did you attend between (14 days prior to test result to test result date)? About how many people attended these gatherings? Did you eat or drink during any of these (or this) gatherings? When you attended this (these) indoor gathering(s), did you wear a face mask all, most, some or none of the time?***

Interviewer: note that this question about mask usage is distinct from the question earlier.

*If they indicate they attended outdoor social gatherings: **How many outdoor social gatherings did you attend between (14 days prior to test result to test result date)? About how many people attended these gatherings? Did you eat or drink during any of these (or this) gatherings? When you attended this (these) outdoor gathering(s), did you wear a face mask all, most, some or none of the time?***

*If they indicate they attended social gatherings that were both inside and outside: **How many social gatherings did you attend between (14 days prior to test result to test result date) that were both indoor and outdoor? About how many people attended these gatherings? Did you eat or drink during any of these (or this) gatherings? When you attended this (these) outdoor gathering(s), did you wear a face mask all, most, some or none of the time?***

- **Did you attend any other kind of event where there are 5 or more people who are not in your household in attendance?** *Interviewer: If necessary, prompt with options like a sporting event, concert, festival, etc. Specify the event: _____*

[Proceed to [section 7](#)]

SECTION 7: OCCUPATION (~1 min)

1. **I am now going to ask you some questions about your occupation. Between [ADD 14 DAYS – TEST DATE HERE] to [ADD TEST DATE] did you attend work, school, or volunteering commitments exclusively at home, both at home and in “in-person”, or exclusively “in-person”.**
 - I work, study, and/or volunteer at home
 - I attend work, school, and/or volunteering “in-person”
 - I attend work, school, and/or volunteering both “in-person” and at home
 - I am not currently working, in school, or in a volunteer position.

[If respondent is a student, skip question and just record “student”]

2. **Can you tell me what your job is?** *(Record open ended response)*

[If they attend work, school, or volunteering commitments in person or both at home & in person, proceed to question 3, otherwise proceed to [Section 8](#)]

3a. Do you come into close contact (within 6 feet) of more than 10 people per day at work/school/volunteering?

Record: Yes or No

3b. Do you primarily attend work/school/volunteering indoors, outdoor, or both indoors and outdoors?

Record: indoors, outdoors, or both

[Proceed to [section 8](#)]

SECTION 8: VACCINATION (~2 min)

I am now going to ask you some questions about the COVID-19 vaccine.

1. **Do you have any conditions that might place you higher risk for COVID-19?** Interviewers may prompt with examples such diabetes, high blood pressure, overweight, being immunocompromised if requested. Select options from list below

- Lung conditions: COPD, lung cancer, cystic fibrosis, moderate to severe asthma, pulmonary fibrosis
- Heart disease
- High blood pressure
- Obesity
- Overweight
- Diabetes
- Weakened immune system: organ transplant, cancer treatment, bone marrow transplant, HIV/AIDS, sickle cell anemia, thalassemia
- Chronic kidney disease
- Chronic liver disease
- Pregnant (first, second, or third trimester)

2. **Have you received any doses of a COVID-19 vaccine?**

Record: Yes, No

[If they have not received any doses, skip to 2b, otherwise ask question 3]

2b. Do you plan to receive any doses of the COVID-19 vaccine?

Record: Yes, No, not sure, refuse

[If they are not planning to receive any doses or are not sure yet, ask 2c, otherwise, ask skip to [section 9](#)]

2c. Can you describe to me why you are not planning to receive the COVID-19 vaccine?

Record reason in check box

3. **How many doses of the COVID-19 vaccine have you received?**

Record: 1, 2

4. **Do you have a vaccine card on hand from when you got the COVID-19 vaccine?**

If yes, ask them to get their vaccine card. If no, ask them to do their best remembering and try pulling up a calendar to help them remember.

5. **What dates did you receive your dose(s)?**

Record the date of each vaccine

6. **Do you know what product COVID-19 vaccine you received?**

Record the product of each dose

7. **Do you have access to a COVID -19 vaccination clinic at your work or school?**

Record: yes/ no/ not sure/ refuse

8. **Where did you get your COVID-19 vaccine?**

Record: mass vaccination site, hospital, nursing home, at my work, at my school, at a retail pharmacy, at a retail shop (eg. Walmart)

9. **At the time you received the vaccine was it required to attend work or school?**

Record: yes/ no/ not sure/ refuse

[Proceed to [section 9](#)]

SECTION 9: DEMOGRAPHICS (~5 min)

I just have a few more questions. Again, anything you share with me is confidential and protected by California's strict privacy laws. The information we collect about you will assist the health department in their COVID-19 response.

1. First, I'm going to ask you some general questions about COVID-19. From the beginning of the pandemic to the time you were tested on [DATE OF TEST], how worried did you feel about getting COVID-19? Would you say you felt:

- Very worried
- Somewhat worried
- Neutral
- Not worried at all

2. Since the beginning of the pandemic, there have been a lot of recommendations on behaviors that can reduce the risk of COVID-19 including avoiding large crowds, travel, and maintaining 6 feet of distance in public places. Would you say that you strongly agree, agree, are neutral, disagree, or strongly disagree that these measures reduce the risk of COVID-19?

Record strongly agree, agree, neutral, disagree, strongly disagree

3. **Another recommendation to reduce the spread of COVID-19 is wearing face masks. Would you say that you strongly agree, agree, are neutral, disagree, or strongly disagree that face masks reduce the risk of COVID-19?**

Record strongly agree, agree, neutral, disagree, strongly disagree

Last, I want to capture some information about demographics.

1. **So do you mind sharing how old you are?**

Record free response

2. **Next, please let me know which of the following race/ethnicities best describe yourself. You may select all that apply:**

- **White**
- **Black**
- **Hispanic**
- **Asian**
- **Native American or Alaska Native**
- **Native Hawaiian or other Pacific Islander**

3. **What is your sex/ gender?**

Record Man, Woman, Non= binary, Prefer to self-describe, Refuse, Don't know

4. **What is your zip code of your home address?**

Record address using encryption tool

5. **What is your home address?**

Record address using encryption tool after verifying it is an address using google maps

6. **Which of the following best describes your living arrangement:**

- **Private home**
- **Apartment, or condominium**
- **Skilled nursing facility**
- **College or university student housing**
- **Military quarters**
- **Emergency or transitional shelter**
- **Other (please describe)**

7. **How many people live in your household?**

8. **How many bedrooms do you have in your household?**

9. **Do you have any children under 18 at your home?**

10. **Are any of your children under 18 attending in-person instruction, school, or daycare?**

11. **Does anyone visit your home on a regular basis like a cleaning service or babysitter?**

If you are talking to a child aged 14-17, at this point you can end the interview with the child and ask to speak with their parent/guardian. When you get back on the phone with the parent or guardian, you can say something like ["Hi again, thank you so much for letting me speak with your child, it was extremely helpful. We are wrapping up the survey with some demographic questions and my last question that I didn't want your child to have to answer was whether you are willing to share your total household income?"]

12. **What is your total household income? Answer on behalf of everyone you share finances with.**

[If you are speaking with POSITIVE case, proceed to 13]

[If you are speaking with NEGATIVE control, proceed to 14]

13. **Thank you for participating in this survey. You may be contacted by another staff member at the health department to check in on you. They will ask you questions about your health and well-being to make sure you're ok.**

14. **Thank you for participating in our survey. We appreciate your time.**

Web Table 1: Counties included in each geographic region.

County	Region
Alameda County	San Francisco San Francisco Bay Area
Alpine County	Sierras Region
Amador County	Sierras Region
Butte County	Northern Sacramento Valley
Calaveras County	Sierras Region
Colusa County	Northern Sacramento Valley
Contra Costa County	San Francisco Bay Area
Del Norte County	Northwestern California
El Dorado County	Sierras Region
Fresno County	San Joaquin Valley
Glenn County	Northern Sacramento Valley
Humboldt County	Northwestern California
Imperial County	San Diego and southern border
Inyo County	Sierras Region
Kern County	San Joaquin Valley
Kings County	San Joaquin Valley
Lake County	Northwestern California
Lassen County	Sierras Region
Los Angeles County	Greater Los Angeles area
Madera County	San Joaquin Valley
Marin County	San Francisco Bay Area
Mariposa County	Sierras Region
Mendocino County	Northwestern California
Merced County	San Joaquin Valley
Modoc County	Sierras Region
Mono County	Sierras Region
Monterey County	Central Coast
Napa County	San Francisco Bay Area
Nevada County	Sierras Region
Orange County	Greater Los Angeles area
Placer County	Sierras Region
Plumas County	Sierras Region
Riverside County	Greater Los Angeles area
Sacramento County	Central Valley
San Benito County	San Francisco Bay Area
San Bernardino County	Greater Los Angeles area
San Diego County	San Diego and southern border
San Francisco County	San Francisco Bay Area
San Joaquin County	San Joaquin Valley
San Luis Obispo County	Central Coast
San Mateo County	San Francisco Bay Area
Santa Barbara County	Central Coast
Santa Clara County	San Francisco Bay Area
Santa Cruz County	San Francisco Bay Area
Shasta County	Northwestern California
Sierra County	Sierras Region
Siskiyou County	Northwestern California
Solano County	San Francisco Bay Area
Sonoma County	San Francisco Bay Area
Stanislaus County	San Joaquin Valley
Sutter County	Northern Sacramento Valley
Tehama County	Northern Sacramento Valley
Trinity County	Northwestern California
Tulare County	San Joaquin Valley
Tuolumne County	Sierras Region
Ventura County	Greater Los Angeles area
Yolo County	Northern Sacramento Valley
Yuba County	Northern Sacramento Valley

Web Table 2: Conditions included in each co-morbidity group.

Condition ¹	Description	Total N=534 N (%)	Cases N=234 N (%)	Controls N=300 N (%)
Chronic lung conditions	Asthma, Chronic obstructive pulmonary disease (CDPH, Cystic Fibrosis, Pulmonary Fibrosis, lung cancer, bronchiectasis, pulmonary embolism, pulmonary hypertension, bronchopulmonary dysplasia,	172 (32.2)	75 (32.1)	97 (32.3)
Immunocompromising conditions	Organ transplant, bone marrow transplant, HIV/AIDS, Cancer Treatment, Rheumatoid arthritis	87 (16.3)	24 (10.3)	63 (21.0)
Obesity	Overweight, Obese, Diabetes	94 (17.6)	49 (20.9)	45 (15.0)
Cardiovascular disease	Heart disease, hypertension, heart failure, coronary artery disease, cardiomyopathies	259 (48.5)	122 (52.1)	137 (45.7)
Liver conditions	Chronic liver disease	3 (0.6)	2 (0.9)	1 (0.3)
Kidney conditions	Chronic kidney disease	12 (2.2)	3 (1.3)	9 (3.0)

¹Preexisting conditions were classified using CDC guidance on underlying medical conditions associated with higher risk of COVID-19 found at <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html>.

Web Table 3: Model comparisons for inter-dose interval and waning effects of two-dose vaccination.

Model	BIC	AIC
Inter-dose models		
<u>Model 1</u> : An interaction between the indicator of having completed the primary vaccination series (receipt of 2 doses >14 days before individuals' testing date) and days elapsed between first and second doses: this model allowed for a continuous relationship between the level of protection experienced after a second dose and days between receipt of first and second doses.	1097.038	1082.507
<u>Model 2</u> : An indicator that individuals received their second dose at a longer-than recommended interval (>21 days for BNT162b2 or >28 days for mRNA-1273), interacted with the indicator of having completed the primary vaccination series: this model allowed for the level of protection experienced after a second dose to differ categorically for individuals who received second doses at recommended or longer-than-recommended intervals.	1104.798	1080.579
<u>Model 3</u> : An indicator that individuals received their second dose at a longer-than recommended interval, interacted with both the indicator of having completed the primary vaccination series and time since second dose receipt: this model allowed for both the level and duration of protection experienced after a second dose to differ for individuals who received second doses at recommended or longer-than-recommended intervals.	1119.559	1085.652
Waning effect over time		
clogit(case~FV*daysPostDose2 + strata(age-sex-region-test))		
Log transformation of days after participants were fully vaccinated	Did not converge	Did not converge
Linear transformation of days after participants were fully vaccinated	1149.536	1130.153
Square root transformation of days after participants were fully vaccinated	1140.875	1126.338

Models are specified in R syntax for regression components. AIC: Akaike information criterion; BIC: Bayesian information criterion.

Web Table 4: Estimated two-dose VE with each month following second dose receipt.

Days after full vaccination	Estimated VE (95% CI)
0	91.3 (83.8,95.4)
30	86.4 (79.3,91.1)
60	81.5 (74.7,86.6)
90	76.4 (68.6,82.4)
120	70.8 (60.4,78.6)
150	64.7 (49.6,75.4)
180	58.0 (36.1,72.4)
210	50.8 (19.7,69.8)
240	42.9 (-0.1,67.1)
270	38.4 (-11.9,65.6)

Participants are considered fully vaccinated with two doses 14 days after receipt of the second dose. Continuous estimates of VE are plotted in **Figure 2**. Bias corrected estimates are plotted in **Figure 5** and listed numerically in **Table S5**.

Web Table 5: Bias-corrected VE estimates.

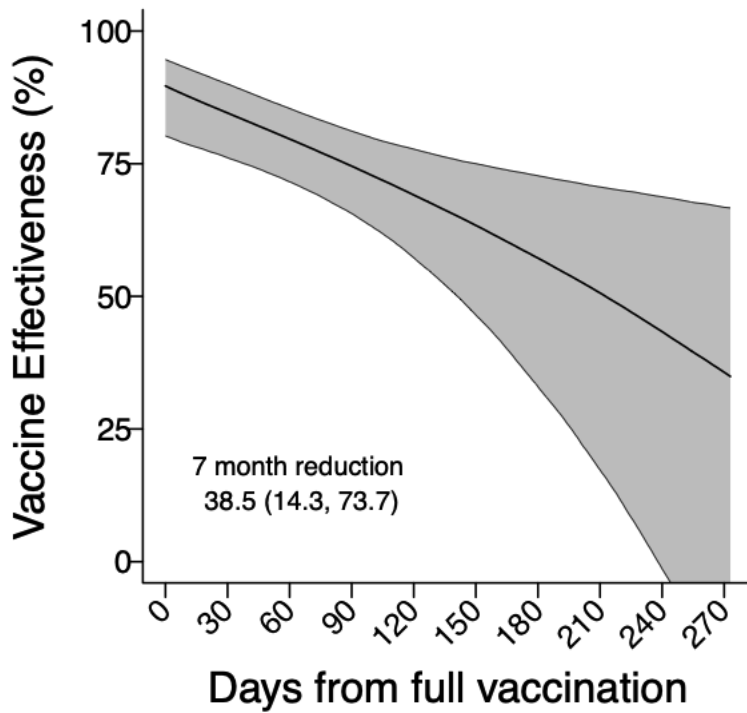
Fig. 5 panel ¹	Proportion uninfected at baseline		Month of full vaccination with two doses									
	Among the vaccinated	Among the unvaccinated	November, 2021	October, 2021	September, 2021	August, 2021	July, 2021	June, 2021	May, 2021	April, 2021	March, 2021	
			Naïve (bias-uncorrected) VE as of December 2021, by month when individuals were considered fully vaccinated with two doses, % (95% CI)									
-	-	-	86.4 (79.3,91.1)	81.5 (74.7,86.6)	76.4 (68.6,82.4)	70.8 (60.4,78.6)	64.7 (49.6,75.4)	58.0 (36.1,72.4)	50.8 (19.7,69.8)	42.9 (-0.1,67.1)	38.4 (-11.9,65.6)	
			Bias-corrected VE as of December 2021, by month when individuals were considered fully vaccinated with two doses, % (95% CI)									
A	100%	100%	86.5 (79.5, 91.1)	81.7 (74.9, 86.7)	76.6 (68.9, 82.6)	71.1 (60.8, 78.9)	65.2 (50.3, 75.7)	59.3 (38.0,73.2)	53.2 (23.6,71.2)	46.4 (5.9, 69.1)	38.9 (-14.5, 66.9)	
B		90%	87.8 (81.5, 92.0)	83.5 (77.4, 88.1)	78.9 (72.0, 84.3)	74.0 (64.7, 81.0)	68.7 (55.3, 78.1)	63.4 (44.2,75.9)	57.9 (31.3, 74.1)	51.7 (15.3, 72.1)	45.0 (-3.0,70.2)	
C		80%	89.2 (83.6, 92.9)	85.4 (79.9, 89.4)	81.3 (75.1, 86.1)	76.9 (68.7, 83.1)	72.2 (60.3, 80.6)	67.4 (50.4,78.6)	62.5 (38.9, 77.0)	57.1 (24.8, 75.2)	51.1 (8.4,73.6)	
D	90%	100%	85.0 (77.2, 90.1)	79.7 (72.1, 85.3)	74.0 (65.5, 80.6)	67.9 (56.5, 76.5)	61.3 (44.8, 73.0)	54.8 (31.1,70.3)	48.0 (15.1, 68.0)	40.4 (-4.5, 65.6)	32.1 (-27.2, 63.3)	
E		90%	86.5 (79.5, 91.1)	81.7 (74.9, 86.7)	76.6 (68.9, 82.6)	71.1 (60.8, 78.9)	65.2 (50.3, 75.7)	59.3 (38.0,73.2)	53.2 (23.6, 71.2)	46.4 (5.9, 69.1)	38.9 (-14.5, 66.9)	
F		80%	88.0 (81.7, 92.1)	83.7 (77.7, 88.2)	79.2 (72.4, 84.5)	74.3 (65.2, 81.2)	69.1 (55.8, 78.4)	63.8 (44.8,76.2)	58.4 (32.1, 74.4)	52.3 (16.4, 72.5)	45.7 (-1.7,70.6)	
G	80%	100%	83.1 (74.3, 88.9)	77.1 (68.6, 83.4)	70.8 (61.2, 78.2)	63.9 (51.0, 73.6)	56.5 (37.9, 69.7)	49.1 (22.4,66.6)	41.5 (4.5, 64.1)	32.9 (-17.6, 61.3)	23.6 (-43.1, 58.7)	
H		90%	84.8 (76.9, 90.0)	79.4 (71.8, 85.1)	73.7 (65.0, 80.4)	67.5 (55.9, 76.2)	60.9 (44.1, 72.7)	54.2 (30.2,69.9)	47.3 (14.1, 67.6)	39.6 (-5.8, 65.2)	31.2 (-28.8, 62.8)	
I		80%	86.5 (79.5, 91.1)	81.7 (74.9, 86.7)	76.6 (68.9, 82.6)	71.1 (60.8, 78.9)	65.2 (50.3, 75.7)	59.3 (38.0,73.2)	53.2 (23.6, 71.2)	46.4 (5.9, 69.1)	38.9 (-14.5, 66.9)	

¹Rows correspond to the estimates plotted in panels A through I in **Figure 5**. Bias-corrected VE estimates are plotted in blue in **Figure 5**. Naïve (bias-uncorrected) estimates of two-dose VE (plotted in grey) for each time point corresponding to modeled estimates in **Figure 2** are additionally listed in **Web Table 4**. Estimates presented in the table are interpreted as bias-uncorrected or bias-corrected vaccine effectiveness, as of December, 2021, according to the month when hypothetical cohorts of individuals attained fully-vaccinated status. For example, for a hypothetical cohort that became fully vaccinated as of May 2021, assuming 80% of the population remained uninfected at the time of being offered vaccination, bias-corrected VE as of December 2021 was 53.2%, compared to 50.8% without bias correction

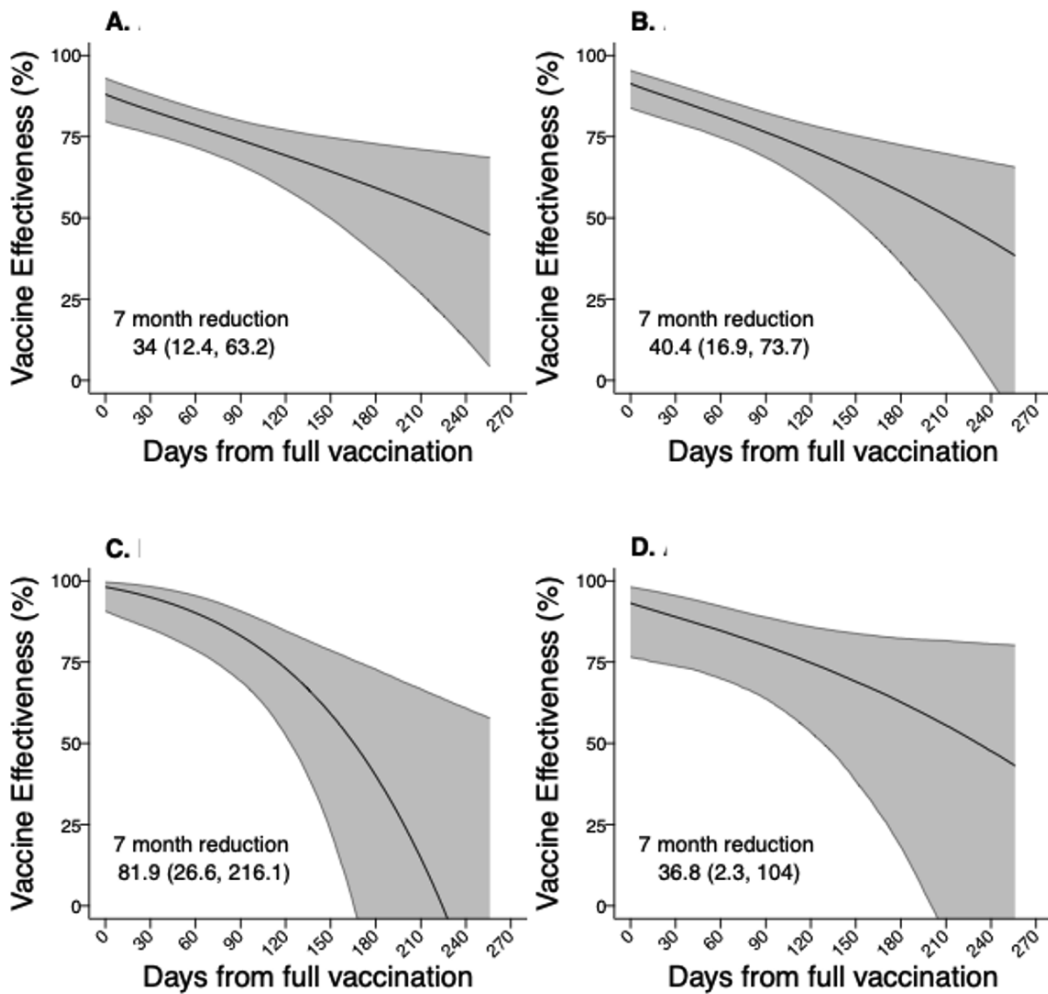
Web Table 6: Characteristics of participants who received a third dose ≥ 7 days before SARS-CoV-2 testing.

	All third dose recipients	Cases	Controls
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
	<i>N</i> =25	<i>N</i> =3	<i>N</i> =22
Age (years)			
18-29	4 (16.0)	0 (0.0)	4 (18.2)
30-49	8 (32.0)	1 (33.3)	7 (31.8)
50-64	5 (20.0)	1 (33.3)	4 (18.2)
65+	8 (32.0)	1 (33.3)	7 (31.8)
Sex			
Male	8 (32.0)	0 (0.0)	8 (36.4)
Female	17 (68.0)	3 (100.0)	14 (63.6)
Month of receipt of third dose			
August	2 (8.0)	0 (0.0)	2 (9.1)
September	5 (20.0)	0 (0.0)	5 (22.7)
October	13 (52.0)	2 (66.7)	11 (50.0)
November	5 (20.0)	1 (33.3)	4 (18.2)
Vaccine series			
3 doses BNT162b2	15 (60.0)	2 (66.7)	13 (59.1)
3 doses mRNA-1273	7 (28.0)	0 (0.0)	7 (31.8)
2 doses BNT162b2 + mRNA-1273	1 (4.0)	0 (0.0)	1 (4.5)
2 doses mRNA-1273 + BNT162b2	2 (8.0)	1 (33.3)	1 (4.5)
Presence of preexisting conditions ¹			
No conditions	11 (44.0)	2 (66.7)	9 (40.9)
Any conditions	14 (56.0)	1 (33.3)	13 (60.1)

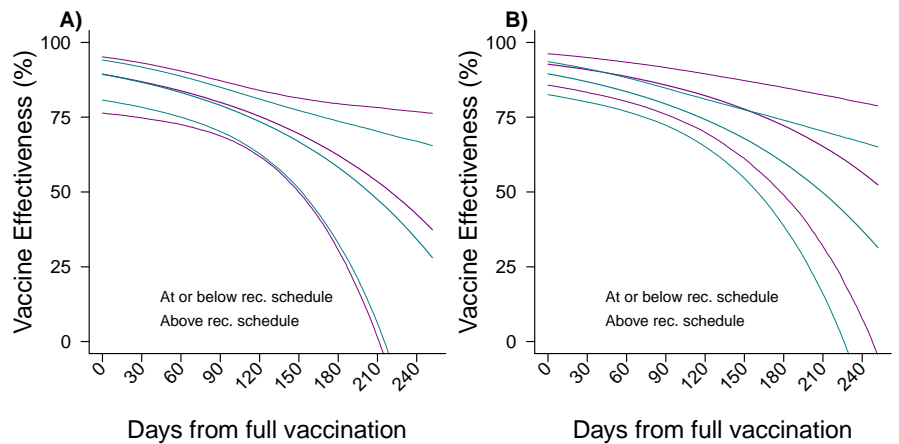
¹Pre-existing conditions reported within the sample are enumerated in **Web Table 2**.



Web Figure 1: Two-dose vaccine effectiveness against symptomatic SARS-CoV-2 infection over time, excluding individuals who did not reference their vaccination card ($N=114$) at the time of their interview. Estimates are obtained in the same framework as those presented in **Figure 2** but excluding individuals who did not refer to their vaccination card (or other record of dates of receipt of each vaccine dose) during their interview.

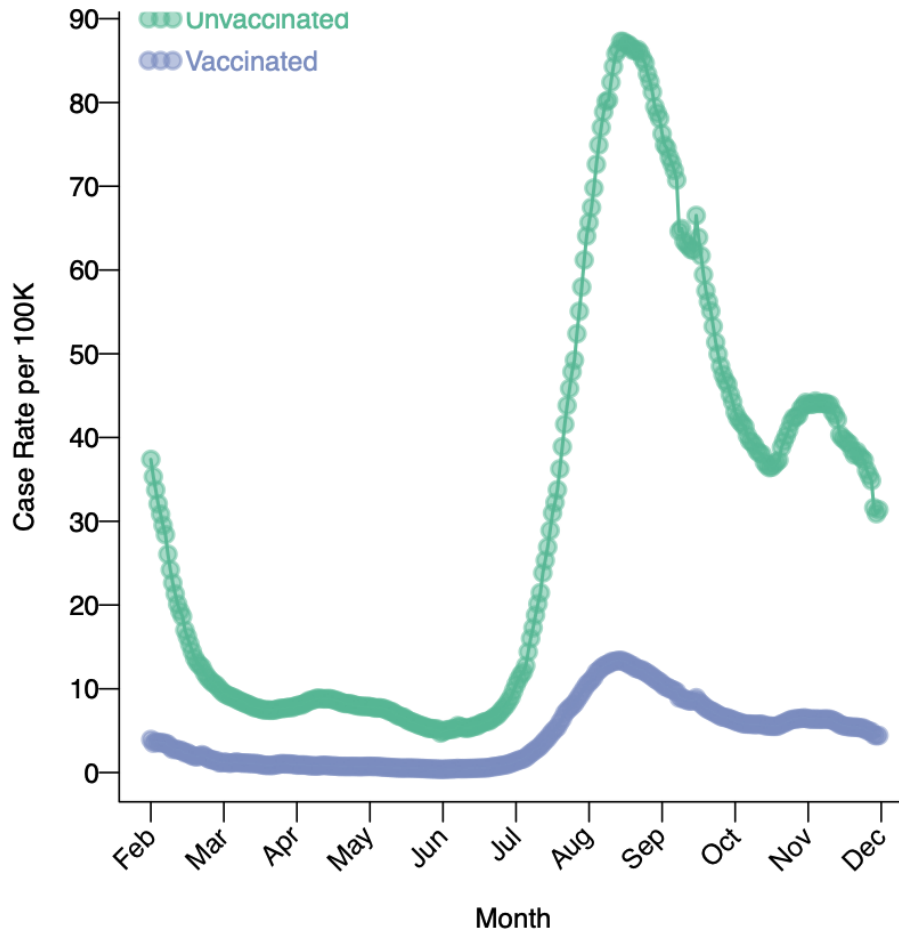


Web Figure 2: Two-dose vaccine effectiveness against alternative SARS-CoV-2 infection endpoints over time. We present estimates (obtained in the same framework as those presented in **Figure 2**) of two-dose vaccine effectiveness by time since individuals were considered fully vaccinated with two doses, for differing endpoint definitions: **A**) any infection (1300 cases with 1174 controls); **B**) SARS-CoV-2 infection with ≥ 1 symptom reported ($N=1049$ cases with 202 test-negative controls reporting symptoms); **C**) SARS-CoV-2 infection with fever and at least one respiratory symptom ($N=205$ cases with 18 test-negative controls reporting these symptoms); **D**) SARS-CoV-2 infection for which participants received care ($N=295$ cases with 97 test-negative controls who also reported receiving care beyond testing). Care was defined as a telemedicine visit ($N=208$; 166 unvaccinated, 42 fully vaccinated), pharmacy visit ($N=40$, 31 unvaccinated, 9 fully vaccinated), outpatient appointment ($N=100$; 80 unvaccinated, 20 fully vaccinated), or urgent care visit ($N=108$; 76 unvaccinated, 32 fully vaccinated).



	Full Vaccination (14 days after 2 nd dose)	7 months	Full Vaccination (14 days after 2 nd dose)	7 months
At or below rec. schedule	89 (76–95%)	46 (2–70%)	89 (83–94%)	48 (12–70%)
Above rec. schedule	89 (91–94%)	52 (-3–78%)	93 (86–96%)	64 (29–82%)

Web Figure 3: Long-term effectiveness of two vaccine doses against symptomatic SARS-CoV-2 infection by interval between receipt of first and second doses. We plot long-term estimates of VE, stratified for participants who received first and second doses spaced at or below the recommended intervals (≤ 21 days for BNT162b2 or ≤ 28 days for mRNA-1273) versus at longer intervals (> 21 days for BNT162b2 or > 28 days for mRNA-1273), estimated via conditional logistic regression models matching cases and controls on age group, sex, region, and week of SARS-CoV-2 test. Panels illustrate results of models assuming differing initial vaccine effectiveness between the groups only (A) or differences in both initial vaccine effectiveness and subsequent rates of waning (B). Model comparisons based on AIC and BIC are presented in **Web Table 3**.



Web Figure 4: Incidence rates of daily reported SARS-CoV-2 infection in California, stratified by vaccination status (unvaccinated versus fully vaccinated with ≥ 2 doses), from February 2021 to December 2021. Incidence rates (presented as a seven-day moving average) were obtained through the publicly available California Health and Human Services Open Data Portal at [<https://data.chhs.ca.gov/dataset/covid-19-post-vaccination-infection-data>].