# Survey Methodology

This study examines the influence of COVID-19 vaccine or vaccine booster attributes on the self-reported willingness of U.S. adults to receive a hypothetical vaccine or booster. A conjoint experiment was conducted from December 14-17, 2021, on Lucid and 2,241 participants were recruited. Vaccine attribute levels were randomized to show 288 unique profiles across participants.

# **Conjoint Prompt**

Participants were first asked their COVID-19 vaccination status and were told to choose from the following list of options:

- 1. I have not chosen to receive the COVID-19 vaccine
- 2. I have received a COVID-19 vaccine but not a booster
- 3. I have received a COVID-19 vaccine and booster

Participants who selected (3) were additionally asked if they had received a COVID-19 vaccine booster.

Vaccinated participants -- those who selected option (2) or (3) from the initial screening question -- were then shown prompts and vaccine profiles for COVID-19 Vaccine boosters. Unvaccinated participants were shown prompts relating to a COVID-19 Vaccine. The prompts were identical except for the inclusion of the word "booster" for vaccinated respondents. The prompt was as follows:

As you may know, cases of a new variant of COVID-19, the Omicron variant, have appeared across the globe. Public health experts do not yet know whether this variant spreads more or less quickly or is more or less deadly than previous variants. You will read about a series of hypothetical [vaccines | vaccine boosters] for COVID-19 and answer a few questions about them.

The prompt for the conjoint experiment additionally included a treatment for half of the sample. This treatment provided the respondent with information about a hypothetical COVID-19 variant, as follows:

As you may know, cases of a new variant of COVID-19, the Omicron variant, have appeared across the globe. Public health experts suggest the new variant may spread more quickly, but be less deadly than previous variants. You will read about a series of hypothetical [vaccines | vaccine boosters] for COVID-19 and answer a few questions about them.

Following these initial prompts -- respondents only receive one prompt, based on vaccination status and randomization to treatment -- vaccine profiles were presented as follows:

*Please consider the hypothetical [vaccine | vaccine booster] described in the table below:* 

Vaccine Attributes	Levels
Efficacy - protection against symptomatic	50%
illness	
Protection duration	6 months
Protection against potential future variants	May require a booster against future variants
Manufacturer	Pfizer
Monetary Incentive	You receive: \$10 incentive

The table above also shows the baseline levels for each of vaccine attribute. Following each vaccine profile, respondents were asked a binary (Yes/No) on whether they would receive the hypothetical [vaccine | vaccine booster]. After this initial binary dependent variable question -- the primary outcome in our analysis -- respondents were asked their likelihood to receive vaccine in the profile on a 7-option Likert-type scale with the following response categories:

- Extremely likely (1)
- Moderately likely (2)
- Slightly likely (3)
- Neither likely nor unlikely (4)
- Slightly unlikely (5)
- Moderately unlikely (6)
- Extremely unlikely (7)

# Additional Analyses

Respondents were first randomly assigned to one of the two contextual primes with information about the transmissibility and lethality of the new omicron variant. Then in the conjoint experiment subjects viewed five hypothetical vaccine profiles, with the level of each attribute randomly assigned. To examine whether this randomization was successful, Table S6 presents F-statistics from a one-way ANOVA of the null hypothesis of equal means across levels for each experimental attribute. In only five of sixty-six cases can we reject the null hypothesis of no demographic differences across treatment groups. We would expect between three and four to be statistically significant by random chance alone. This suggests that randomization was broadly successful. However, to ensure that demographic differences are not skewing our estimates of treatment effects, we also estimate all our regressions with demographic controls. Models with controls yield virtually identical results to those excluding controls.

All analyses in the text use a binary dependent variable constructed from the first question. Alternate analyses using the full 7-point Likert scale from the second question yield substantively similar results and are presented in Table S7.

Finally, to ensure that our results are not skewed by inattentive subjects, we re-estimated our regressions after dropping respondents who took the least amount of time to complete the survey. The first model of Table S8 replicates the prior model for all respondents. Model 2 of Table S8 drops the bottom 5% of the distribution in terms of time to complete the survey. Model 3 drops the bottom 10%. Results are virtually identical across all three models.

## Survey Module

## *Survey 1, Module 1: Unvaccinated Respondents*

## Screening:

Please select from below what best describes your COVID-19 vaccination status.

- (1) I have not chosen to receive the COVID-19 vaccine
- (2) I have received a COVID-19 vaccine but not a booster
- (3) I have received a COVID-19 vaccine and booster

### Control

As you may know, cases of a new variant of COVID-19, the omicron variant, have appeared across the globe. Public health experts do not yet know whether this variant spreads more or less quickly or is more or less deadly than previous variants. You will read about a series of hypothetical vaccines for COVID-19 and answer a few questions about them.

### Treatment A

As you may know, cases of a new variant of COVID-19, the omicron variant, have appeared across the globe. Public health experts suggest the new variant may spread more quickly, but be less deadly than previous variants. You will read about a series of hypothetical vaccines for COVID-19 and answer a few questions about them.

### Questions

- If you had to choose, would you choose to get this vaccine, or would you choose not to be vaccinated?
- How likely or unlikely would you be to get the vaccine described above?
- How likely or unlikely would you be to get the vaccine described above if there were an antiviral treatment option available for COVID?

### Survey 1, Module 2: Vaccinated (+ Boosted) Respondents

### Control

As you may know, cases of a new variant of COVID-19, the omicron variant, have appeared across the globe. Public health experts do not yet know whether this variant spreads more or less quickly or is more or less deadly than previous variants. You will read about a series of hypothetical vaccine boosters for COVID-19 and answer a few questions about them.

### Treatment A

As you may know, cases of a new variant of COVID-19, the omicron variant, have appeared across the globe. Public health experts suggest the new variant may spread more quickly, but be less deadly than previous variants. You will read about a series of hypothetical vaccine boosters for COVID-19 and answer a few questions about them.

#### Questions

- If you had to choose, would you choose to get this vaccine booster?
- How likely or unlikely would you be to get the vaccine booster described above?
- How likely or unlikely would you be to get the vaccine booster described above if there were an antiviral treatment option available for COVID?

# Measures and Index Construction

# Primary Choice Set & Attributes

Feature Type	Feature options	
Efficacy – protection against symptomatic	50%	
infection	70%	
	90%	
Efficacy - protection against future potential	Protects against future variants	
variants	May require another booster against future variants	
Protection duration	6 months	
	One Year	
	Two Years	
	Lifetime	
Manufacturer of booster	Pfizer	
	Moderna	
	Johnson and Johnson	
Incentives	Day off work (paid)	
	Day off work (unpaid)	
	\$10	
	\$100	

# **Post-Treatment Questions**

# Healthcare Engagement Questions

- How often in the past have you gotten a flu vaccination?
  - (1) Never (2) Once or twice (3) Most years (4) Every year
- In general, how safe do you think vaccines are?
  - Safety: (1) extremely (2) very (3) somewhat (4) not at all (5) don't know
- Thinking about childhood diseases, such as measles, mumps, rubella, and polio: should all children be required to be vaccinated, or should parents be able to decide NOT to vaccinate their children?
  - (1) Require all be vaccinated (2) Parents should decide (3) Don't know
- Do you currently have health insurance?
  - (1) Yes (2) No (3) Prefer Not to Say
  - Branch if (1)
  - Please select from below what best describes your insurance provider
    - (1) Medicare (2) Medicaid (3) employer-sponsored insurance (4)
    - insurance from healthcare.gov (ACA exchange) (5) uninsured (6) Other
- Branch if Vaccinated
  - Suppose that the COVID vaccine booster required an out-of-pocket fee in order to receive it. Would you choose to receive the booster shot if the out-of-pocket fee was... [cascade down with yes responses]
    - \$50 (y/n) -
    - \$100 (y/n)
    - \$150 (y/n)

# COVID Questions

- Do you personally know anyone who has tested positive for COVID-19 (including yourself)?
  - o (1) Yes (2) No
  - Branch if (1)
  - Who has tested positive? Select all that apply.
    - (1) You (2) Immediate family (3) More distant family members (4) Close friends (5) More distant friend(s) or acquaintances
    - Branch if (1)
      - Have you tested positive for COVID-19 in the last 6 months?
      - (1) Yes (2) No
- Do you personally know anyone who has died due to complications from COVID-19?
  - (1) Yes (2) No
- How likely do you think it is that you, someone in your family, or someone else you personally know will become infected with COVID-19 in the next few weeks?
  - (1) Very (2) Somewhat (3) Not Very (4) Not At All
- How likely do you think it is that you would be hospitalized if you contracted COVID-19?
  (1) Very (2) Somewhat (3) Not Very (4) Not At All
- How likely do you think it is that you would die if you were hospitalized COVID-19?

o (1) Very (2) Somewhat (3) Not Very (4) Not At All

# Media Source Questions

- How much, if at all, do you use each of the following approaches for staying up-to-date on the news?
  - Watching television news programs that report the day's news
    - (1) A great deal (2) A fair amount (3) Only a little (4) Not at all
  - Reading a newspaper (printed or online version)
    - (1) A great deal (2) A fair amount (3) Only a little (4) Not at all
  - Seeing or reading links to news stories on Facebook or other social media sites
    - (1) A great deal (2) A fair amount (3) Only a little (4) Not at all
- From below, please select your main source of news information
  - (1) Newspapers (print or online version) (2) Broadcast news (CBS / NBC / ABC) (3) Cable News (CNN / FOX / MSNBC /OAN) (4) Social Media (FaceBook / Twitter / WhatsApp)

# News, Information, and Bias Questions

- If presented information related to COVID-19 from the following [news organizations/public figures], how likely are you to trust it to be true?
  - How likely are you to trust COVID-19 Information from [X]
    - Fox News, CNN, OAN, NPR, ABC, NBC, CBS, Local Radio News, National Radio News
    - Extremely/Moderately/Slightly for Likely and Unlikely centered @ Neither
  - How likely are you to trust COVID-19 Information from [X]
    - CDC, Dr. Anthony Fauci, President Biden, Family physician, your pastor, Alex Jones, Tucker Carlson, Anderson Cooper, local public health officials
    - Extremely/Moderately/Slightly for Likely and Unlikely centered @ Neither

# Demographic Questions

- What is your age? [Dropdown]
- Politically, I consider myself:
  - (1) Very Liberal, (2) Liberal, (3) Somewhat Liberal, (4) Moderate, (5) Somewhat Conservative, (6) Conservative, (7) Very Conservative
- In politics, as of today, do you consider yourself a Republican, a Democrat, or an Independent
  - (1) Republican (2) Democrat (3) Independent (4) Other/ I don't know
- As of today, do you lean more toward the Democratic Party or the Republican Party?
  - (1) Democrat (2) Republican (3) Neither/IDK
- Do you approve or disapprove of the way Joseph Biden is handling his job as president?
  - $\circ$  (1) Approve (2) Disapprove (3) No opinion
- What is your gender?
  - (1) Male (2) Female (3) Prefer not to say
- Race: What best describes your race/ethnicity? Check all that apply.

- (1) American Indian, (2) Asian, (3) Black or African American, (4) Hispanic, (5)
  White, and (6) Other. We create binary variables for each category.
- What is your annual income range?
  - (1) < 20k (2) 20-39k (3) 40-59k (4) 60-79 (5) 80-99k (6) 100k</li>
- What is the highest level of education you have completed?
  - (1) Less than High School, (2) High School/ GED, (3) Some College, (4) 2-year College Degree, (5) 4-year College Degree, (6) Master's Degree, (7) Doctoral Degree, and (8) Professional Degree.
- Marital status
  - (1) Single (2) Married (3) Divorced
- How many people reside in your household?
  - (1) Yourself (2) 2 people (3) 3+ people
  - Branch if ! (1)
    - Are any members of your household under 18?
      - (1) Yes (2) No
    - Are any members of your household over 65 and/or have chronic medical conditions?
      - (1) Yes (2) No
- Select from below which best describes your current work:
  - (1) Remote capable WFH (2) In-person, limited interaction (3) In person, high interaction
- What best describes your religious beliefs?
  - (1) Protestant (2) Roman Catholic (3) Mormon (4) Orthodox such as Greek or Russian Orthodox (5) Jewish (6) Muslim (7) Buddhist (8) Hindu (9) Atheist (10) Agnostic (11) Something else (12) Nothing in particular
  - Branch if 1 | 2 | 3 | 4
    - Would you describe yourself as a born-again or evangelical Christian, or not?
    - (1) Yes (2) No
- In which state do you currently reside? [Dropdown]

Figure S1: Marginal Means for Vaccine Attributes for Unvaccinated Respondents



Note: Marginal means obtained from OLS regression in Table S5, Model (1).

	Lucid	2020 ANES	2018 GSS	US Census
Demographics				
Black	13%	9%	16%	13%
Latino	9%	9%	6%	18%
Female	52%	54%	55%	51%
% College degree	38%	45%	33%	32%
Median age	43 years	52 years	48 years	38 years
Political Characteristics				
Republican	27%	31%	23%	
Democrat	42%	35%	32%	
Ideology (% moderates)	37%	22%	38%	

### Table S1. Comparison of Survey Demographics to National Benchmarks

*Note:* All Census figures taken from the 2018 American Community Survey. Comparison surveys are the 2020 American National Election Study (<u>https://electionstudies.org/data-center/2020-time-series-study/</u>) and the 2018 General Social Survey (https://gss.norc.org/). Partisan measures do not include those who lean toward one party or the other.

Vaccination Attributes	Levels
Efficacy - protection against symptomatic illness	50% 70% 90%
Protection duration	6 months 1 year 2 years
Protection against potential future variants	May require a booster against future variants Protects against future variants
Manufacturer	Pfizer Johnson & Johnson Moderna
Monetary Incentive	You receive: \$10 incentive You receive: \$100 incentive You receive: \$1,000 incentive You receive: \$1 Paid day off work

Table S2. Levels and Attributes from Conjoint Survey Experiment

	(1)
Efficacy: 50%	0.489
	(0.020)
Efficacy: 70%	0.592
	(0.020)
Efficacy: 90%	0.725
	(0.019)
Duration: 6 months	0.572
	(0.019)
Duration: 1 year	0.620
	(0.019)
Duration: 2 years	0.607
	(0.019)
Protection: No future variant protection	0.578
	(0.017)
Protection: Protects against future variants	0.621
	(0.016)
Manufacturer: Pfizer	0.676
	(0.019)
Manufacturer: Moderna	0.625
	(0.020)
Manufacturer: Johnson & Johnson	0.498
	(0.021)
Incentive: \$10	0.527
	(0.024)
Incentive: Paid day off work	0.558
	(0.022)
Incentive: \$100 incentive	0.612
	(0.021)
Incentive: \$1,000 incentive	0.691
	(0.020)

Table S3: Marginal Means for Vaccine Attributes for Vaccinated, Unboosted Respondents

*Note:* Marginal means obtained from OLS regression in Table 2, Model (1).

	Control	Treatment
Efficant 70%	0 002***	0 110***
Efficacy. 70%	0.095	(0.025)
Efficacy: 00%	(0.034)	0.055
Lincacy. 50%	0.282	0.189
Duration: 1 year	0.034)	0.025
	(0.072	(0.023
Duration: 2 years	0.063*	0.006
	(0.033)	(0.032)
Protection: Protects against future variants	0.051**	0.032
	(0.026)	(0.024)
Manufacturer: Moderna	-0.060*	-0.041
	(0.034)	(0.034)
Manufacturer: Johnson & Johnson	-0.185***	-0.173***
	(0.033)	(0.033)
Monetary Incentive: Paid day off work	0.002	0.062
	(0.039)	(0.039)
Monetary Incentive: \$100 incentive	0.079*	0.091**
	(0.041)	(0.039)
Monetary Incentive: \$1,000 incentive	0.188***	0.139***
, , ,	(0.038)	(0.039)
Constant	0.382***	0.509***
	(0.048)	(0.051)
		-
Observations	1,390	1,350
R-squared	0.110	0.064

Table S4. Effects of Attributes on Booster Uptake by Contextual Treatment for Vaccinated, Unboosted Respondents

*Note:* \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. OLS regressions on willingness to receive booster among fully vaccinated, but un-boosted respondents. Base categories for each attribute are: Efficacy – 50%; Protection duration – 6 months; Future variants – May require a booster against future variants; Manufacturer – Pfizer; Incentive -- \$10. Robust standard errors clustered on respondent in parentheses; all significance tests are two-tailed.

	(1)	(2)
	-0 009	-0.007
	(0.020)	(0.018)
Efficacy: 90%	0.067***	0.072***
	(0.022)	(0.020)
Duration: 1 year	0.003	0.016
	(0.020)	(0.017)
Duration: 2 years	0.042**	0.037*
·	(0.021)	(0.019)
Protection: Protects against future variants	-0.021	-0.015
•	(0.017)	(0.015)
Manufacturer: Moderna	-0.002	-0.002
	(0.021)	(0.019)
Manufacturer: Johnson & Johnson	0.000	0.002
	(0.020)	(0.018)
Monetary Incentive: Paid day off work	-0.002	0.003
	(0.024)	(0.020)
Monetary Incentive: \$100 incentive	0.041*	0.033
	(0.023)	(0.021)
Monetary Incentive: \$1,000 incentive)	0.064***	0.074***
	(0.024)	(0.022)
Likely more contagious, less lethal treatment	-0.014	0.007
	(0.031)	(0.027)
Democrat		0.314***
		(0.037)
Republican		0.065*
		(0.034)
Female		-0.128***
		(0.028)
Age (in 10s)		-0.057***
		(0.009)
RIACK		-0.045
lating.		(0.045)
Latino		0.050
Education		0.040)
Education		(0.011)
Incomo		0.002
lincome		(0.010)
Work from home		0 136***
work norm norme		(0.041)
Work in-person remote canable		-0.025
		(0.064)
Work in-person, essential		0.010
		(0.034)
Constant	0.290***	0.278***
	(0.057)	(0.080)
	. ,	. ,
Observations	3,095	3,095
R-squared	0.01	0.21

# Table S5. AMCEs and OLS Regression Results for Unvaccinated Respondents

*Note:* \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. OLS regressions on willingness to receive a vaccine among unvaccinated respondents. Base categories for each attribute are: Efficacy – 50%; Protection duration – 6 months; Future variants – May require a booster against future variants; Manufacturer – Pfizer; Incentive -- \$10. Robust standard errors clustered on respondent in parentheses; all significance tests are two-tailed.

	Efficacy	Duration	Protection	Manufacturor	Incontivo	Context
	Lincacy	Duration	FIOLECTION	Manufacturer	incentive	CONTEXT
Democrat	0.30 (0.74)	2.27 (0.10)	0.96 (0.33)	0.41 (0.66)	0.03 (0.99)	0.57 (0.45)
Republican	0.54	0.91	3.53	1.54	0.72	0.08
	(0.58)	(0.40)	(0.06)	(0.21)	(0.54)	(0.77)
Female	0.14	0.15	0.40	1.58	1.46	6.22
	(0.87)	(0.86)	(0.53)	(0.21)	(0.22)	(0.01)
Age	0.12	3.01	1.55	0.12	0.43	1.83
	(0.89)	(0.05)	(0.21)	(0.89)	(0.73)	(0.18)
Black	0.36	0.29	2.08	0.86	0.14	1.58
	(0.70)	(0.75)	(0.15)	(0.42)	(0.94)	(0.21)
Latino	0.39	0.85	2.07	0.11	1.63	0.05
	(0.68)	(0.43)	(0.15)	(0.90)	(0.18)	(0.82)
Education	1.30	0.28	0.03	0.67	0.79	1.36
	(0.27)	(0.75)	(0.87)	(0.51)	(0.50)	(0.24)
Income	1.24	0.14	1.31	1.14	0.86	6.48
	(0.29)	(0.87)	(0.25)	(0.32)	(0.46)	(0.01)
Work from home	0.28	0.46	4.50	0.38	1.46	2.48
	(0.76)	(0.63)	(0.03)	(0.68)	(0.22)	(0.12)
Remote work capable	0.50	0.17	7.82	0.35	1.00	2.15
	(0.61)	(0.84)	(0.01)	(0.70)	(0.39)	(0.14)
Essential worker	1.57	0.19	0.71	1.17	0.42	3.58
	(0.21)	(0.82)	(0.40)	(0.32)	(0.74)	(0.06)

# Table S6: Demographic Balance Across Experimental Attributes

Note: F-statistics (with p-values below in parentheses) from a one-way ANOVA of the null hypothesis of equal means across levels for each experimental attribute.

	(1)	(2)
Efficacy: 70%	0.501***	0.471***
	(0.112)	(0.107)
Efficacy: 90%	0.967***	0.942***
	(0.112)	(0.112)
Duration: 1 year	0.126	0.114
Duration: 2 years	(0.109)	0.100)
	(0.111)	(0.107)
Protection: Protects against future variants	0.114	0.105
	(0.084)	(0.083)
Manufacturer: Moderna	-0.218*	-0.200*
	(0.116)	(0.113)
Manufacturer: Johnson & Johnson	-0.788***	-0.774***
	(0.113)	(0.110)
Monetary Incentive: Paid day off work	0.020	0.038
Monotary Incontivo: \$100 incontivo	(U.132) 0.412***	(0.128)
	(0 133)	(0 127)
Monetary Incentive: \$1,000 incentive)	0.695***	0.738***
······································	(0.131)	(0.128)
Likely more contagious, less lethal treatment	()	0.322**
		(0.141)
Democrat		0.437**
		(0.179)
Republican		-0.485**
Famile		(0.197)
remaie		-0.176
Age (in 10s)		-0.085
, (b) (iii ±00)		(0.052)
Black		-0.206
		(0.252)
Latino		0.216
		(0.236)
Education		0.069
1		(0.052)
income		0.087*
Work from home		-0 254
		(0.222)
Work in-person, remote capable		-0.155
		(0.266)
Work in-person, essential		-0.371**
		(0.189)
Likely more contagious, less lethal treatment = 2, Likely more contagious, less lethal	0.334**	
Constant	(U.147) 2.670***	2 400***
CONSTRUCT	3.0/U**** (0.175)	5.480****
	(0.175)	(0.441)
Observations	2,740	2,740
R-squared	0.073	0.115

Table S7: Replication of Analysis on Fully Vaccinated, Unboosted Respondents Using 7-Point Likert Scale Measure of Willingness to Receive Vaccine Profile

*Note:* \*\*\* p<0.01, \*\* p<0.05, \* p<0.10. OLS regressions on willingness to receive a vaccine among unvaccinated respondents measured on a 7-point Likert scale. Base categories for each attribute are: Efficacy – 50%; Protection duration – 6 months; Future variants – May require a booster against future variants; Manufacturer – Pfizer; Incentive -- \$10. Robust standard errors clustered on respondent in parentheses; all significance tests are two-tailed.

	(1)	(2)	(3)
	All	Drop 5%	Drop 10%
Efficacy: 70%	0.103***	0.099***	0.110***
	(0.024)	(0.025)	(0.026)
Efficacy: 90%	0.237***	0.240***	0.239***
	(0.024)	(0.024)	(0.025)
Duration: 1 year	0.048**	0.054**	0.055**
	(0.022)	(0.023)	(0.024)
Duration: 2 years	0.035	0.038	0.036
	(0.023)	(0.024)	(0.024)
Protection: Protects against future variants	0.043**	0.048***	0.040**
	(0.018)	(0.018)	(0.019)
Manufacturer: Moderna	-0.051**	-0.052**	-0.048*
	(0.024)	(0.025)	(0.026)
Manufacturer: Johnson & Johnson	-0.178***	-0.179***	-0.181***
	(0.023)	(0.024)	(0.025)
Incentive: Paid day off work	0.031	0.035	0.031
	(0.027)	(0.028)	(0.029)
Incentive: \$100 incentive	0.085***	0.089***	0.095***
	(0.028)	(0.029)	(0.030)
Incentive \$1,000 incentive)	0.164***	0.172***	0.174***
	(0.027)	(0.028)	(0.029)
Likely more contagious, less lethal treatment	0.076***	0.077***	0.078**
	(0.029)	(0.029)	(0.030)
Constant	0.407***	0.390***	0.385***
	(0.036)	(0.037)	(0.038)
Observations	2,740	2,600	2,455
R-squared	0.090	0.094	0.095

Table S8: Dropping "Inattentive" Respondents Who Completed Survey Quickly

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. OLS regressions on willingness to receive booster among fully vaccinated, but non-boosted respondents. Models 2 and 3 drop the bottom 5% and 10% of respondents in terms of time taken to complete the survey. Base categories for each attribute are: Efficacy-50%; Protection duration-6 months; Future variants:-May require a booster against future variants; Manufacturer-Pfizer; Incentive-\$10. Robust standard errors in parentheses