

## Supplemental Online Content

### Event study models

To assess how the outcomes of interested changed over time before and after vaccination, we estimated so-called “event study” models, wherein  $Vaccinated_{it}$  was replaced with dummy variables indicating the number of periods prior to or following a respondent’s first report of COVID-19 vaccination.<sup>1,2</sup> We binned dummy variables for lags at 4 or more waves post-vaccination, reflecting the 99<sup>th</sup> percentile of the distribution of observations in our sample. The event study specification provides two important pieces of information not observable in the single-coefficient two-way fixed effects model.<sup>3</sup> First, that model assumes that distress would have continued along the same trajectory in those who were or were not vaccinated. While this cannot be tested explicitly, including all event leads reveals in the pre-treatment period when coefficients for leads (pre-vaccination) differing significantly from zero would suggest violation of the parallel trends assumption. By contrast, non-zero coefficients for lags (post-vaccination) indicate statistically significant treatment effects. Second, the lags make it possible to see whether the effects grow or shrink over time, and whether they persist. For all analyses, we clustered standard errors by individuals to account for serial correlation. Models were estimated using the *eventdd* command in Stata.<sup>3</sup>

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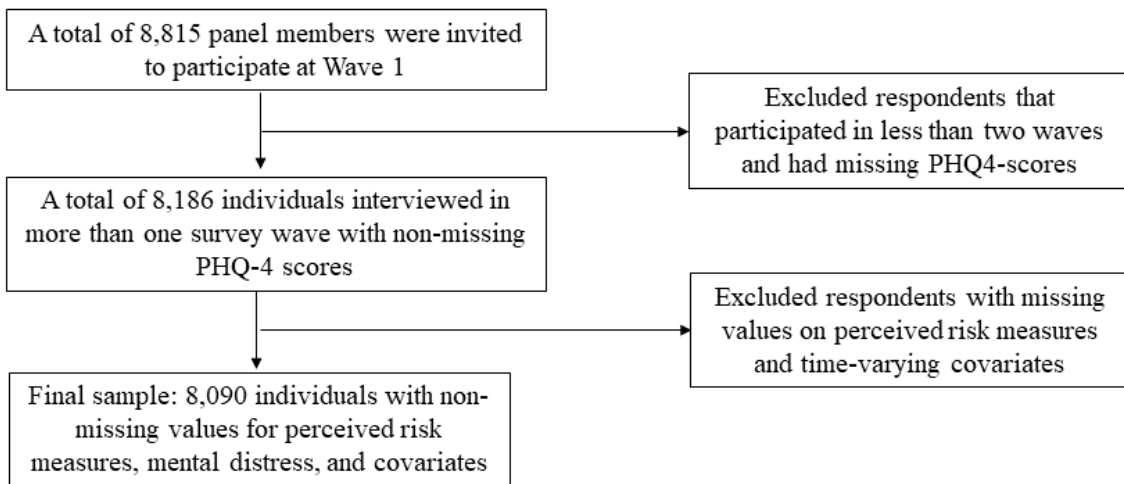
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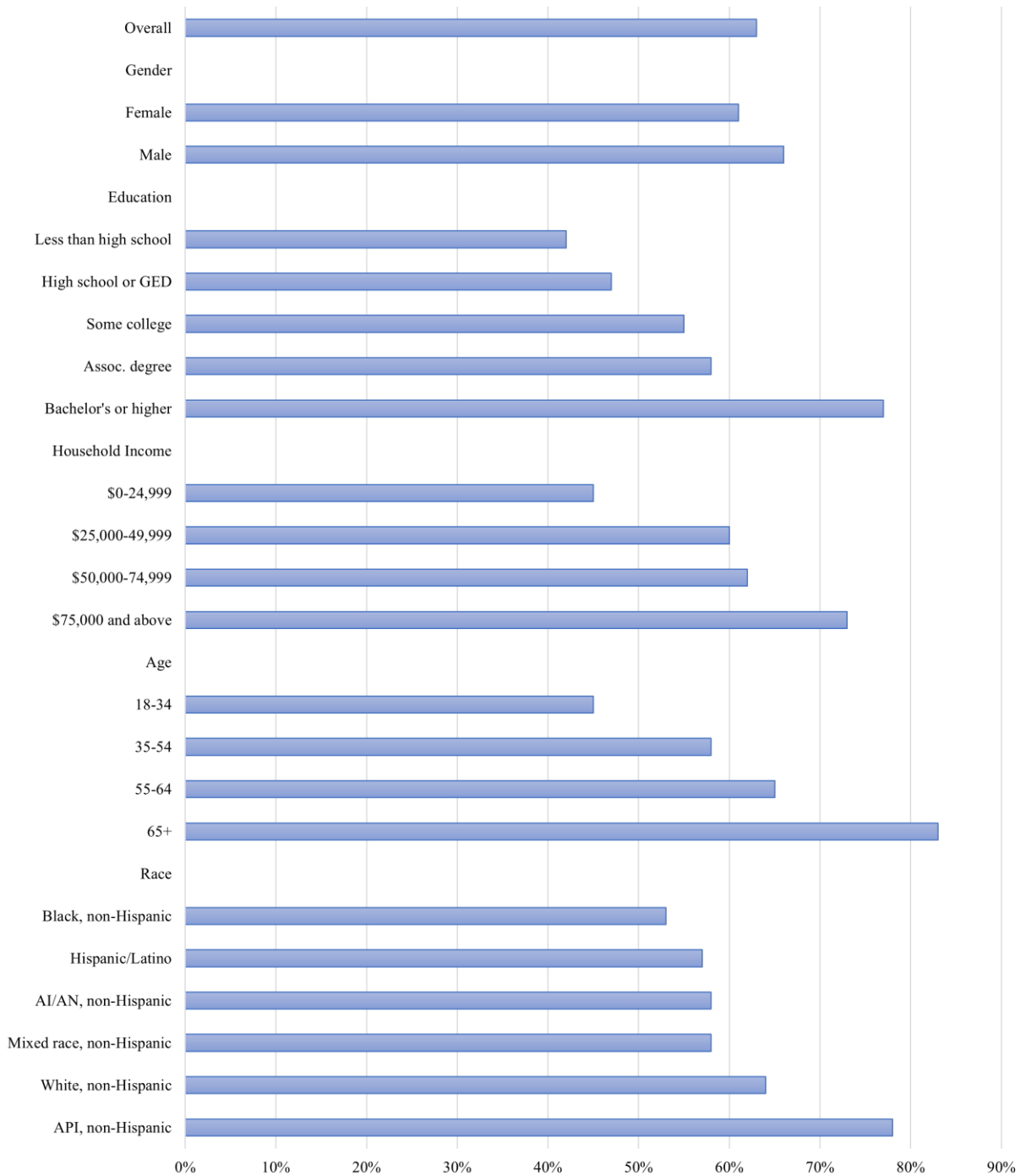
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**Figure S1.** Flowchart for sample inclusion

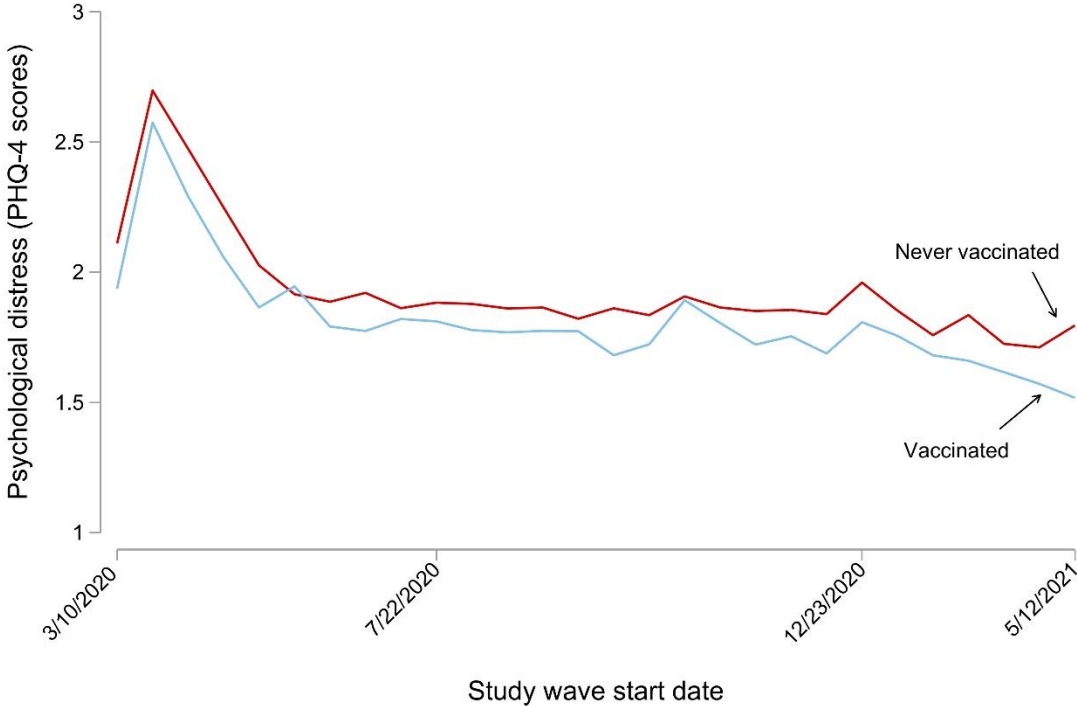


**Figure S2.** Prevalence of reporting at least one dose of COVID-19 vaccination across sociodemographic subgroups between December 2020 and June 2021



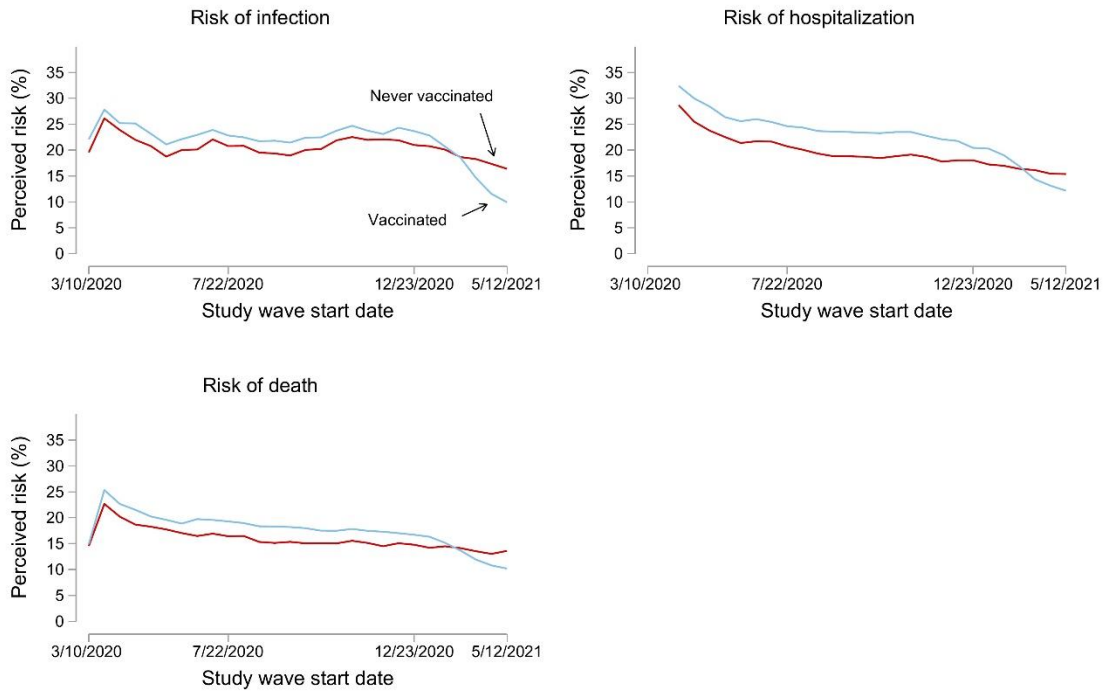
**Note:** estimates are unweighted and based the last observation among those who exited the sample between December 2020 and June 2021. AI/AN = American Indian or Alaska Native. API = Asian and Pacific Islanders.

**Figure S3:** Unadjusted temporal trends in psychological distress over 28 waves in the Understanding Coronavirus in America study, March 2020 to June 2021



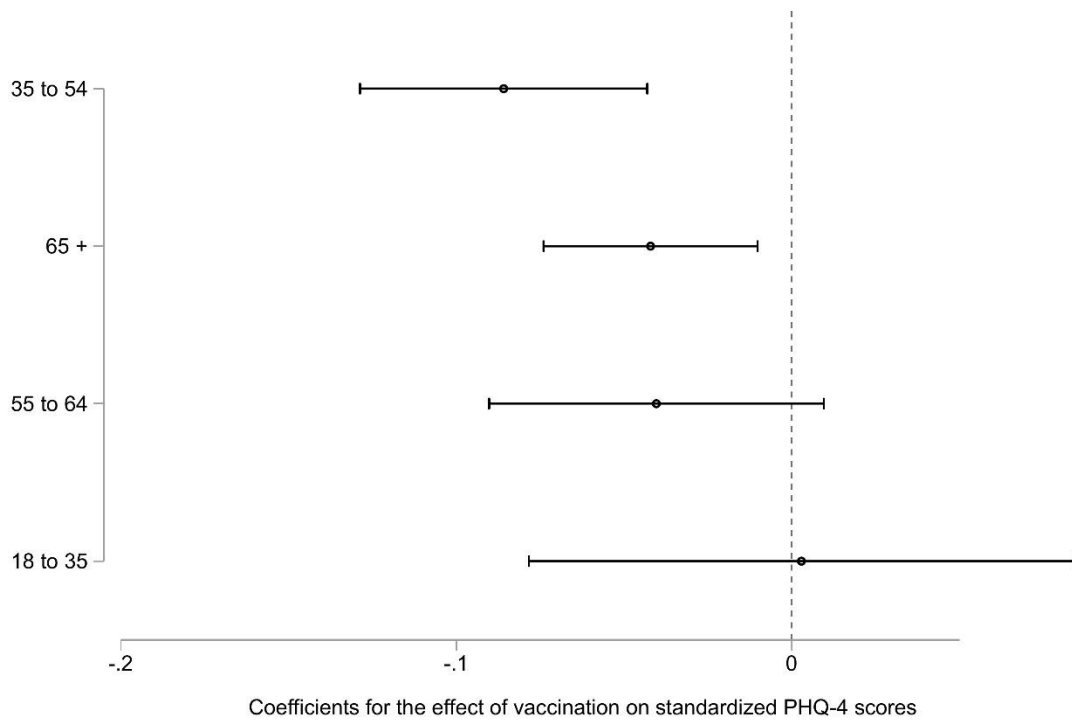
Notes: Blue lines are secular trends in distress over time for respondents who became vaccinated. Red lines are secular trends over time for respondents who did not become vaccinated.

**Figure S4:** Unadjusted temporal trends in risk perceptions among vaccinated respondents before and after vaccination, March 2020 to June 2021



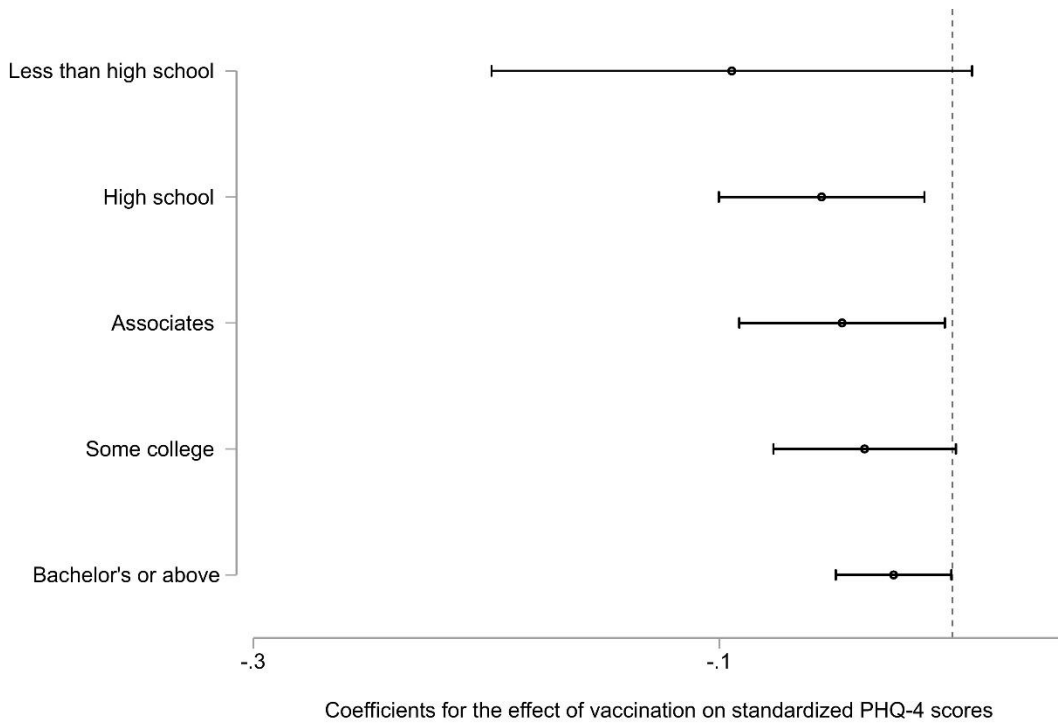
Notes: Blue lines are secular trends in risk perceptions over time for respondents who became vaccinated. Red lines are secular trends over time for respondents who did not become vaccinated.

**Figure S5.** Two-way fixed effects models with psychological distress (PHQ-4) regressed on the vaccination status, stratified by age categories, April 2020 to June 2021



Notes: Point estimates and 95% confidence intervals are from separate two-way fixed effects models stratified by subgroup. Models control for individual and wave fixed effects, receiving Supplemental Nutrition Assistance Program (SNAP) benefits in the month prior to the survey, whether the respondent received unemployment insurance in the past 14 days, whether the respondent has been diagnosed with COVID-19, and employment status at the time of the survey. Standard errors are clustered at the individual level.

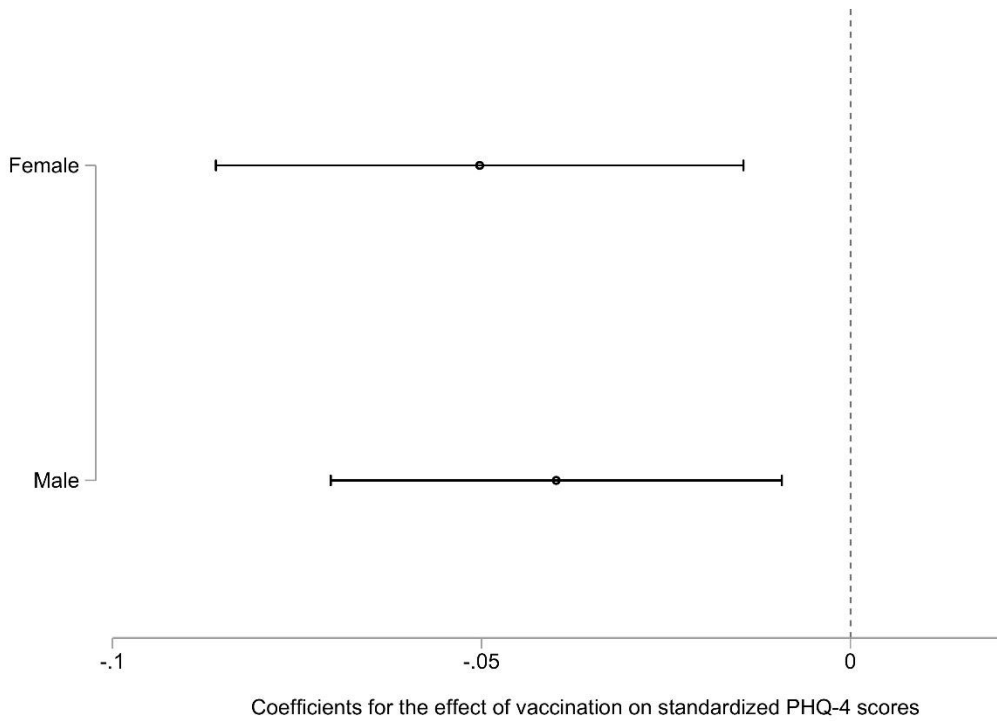
**Figure S6.** Two-way fixed effects models with psychological distress (PHQ-4) regressed on vaccination status, stratified by education, April 2020 to June 2021



Notes: Point estimates and 95% confidence intervals are from separate two-way fixed effects models stratified by subgroup. Models control for individual and wave fixed effects, receiving Supplemental Nutrition Assistance Program (SNAP) benefits in the month prior to the survey, whether the respondent received unemployment insurance in the past 14 days, whether the respondent has been diagnosed with COVID-19, and employment status at the time of the survey. Standard errors are clustered at the individual level.

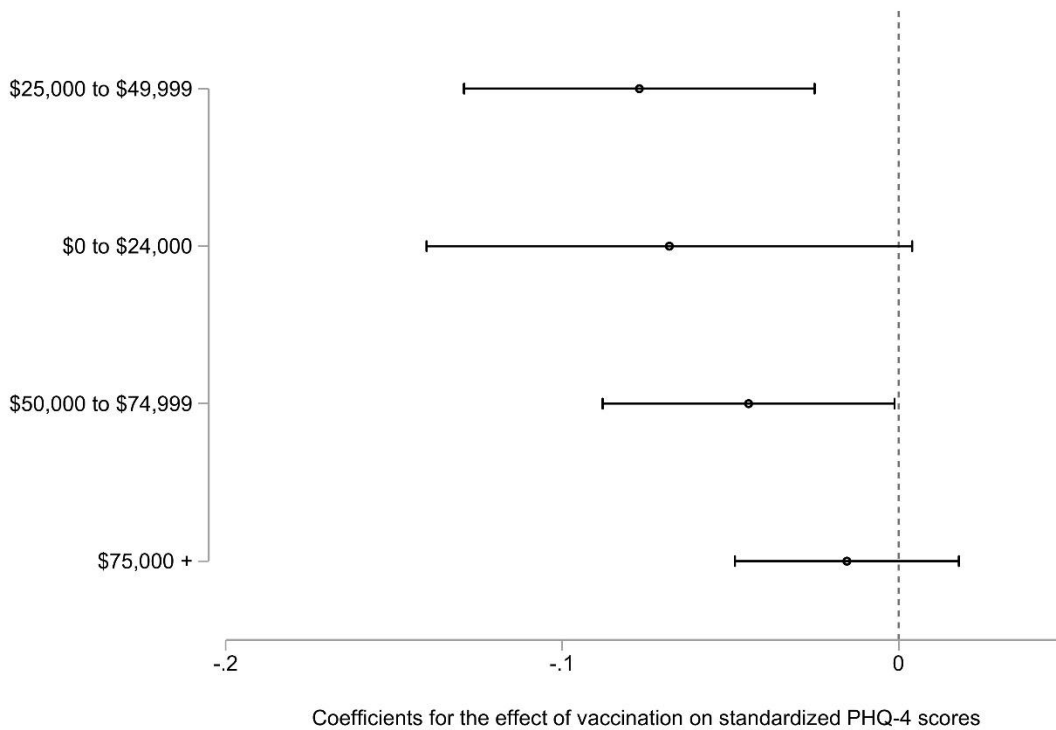


**Figure S7.** Two-way fixed effects models with psychological distress (PHQ-4) regressed on vaccination status, stratified by gender, April 2020 to June 2021



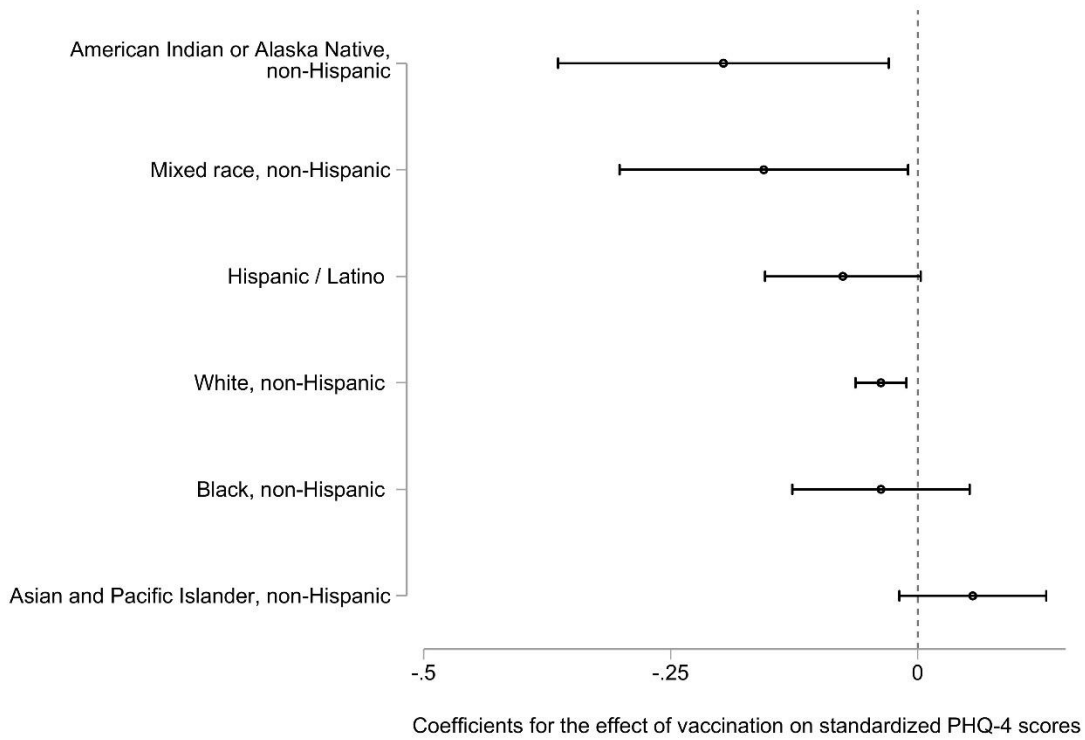
Notes: Point estimates and 95% confidence intervals are from separate two-way fixed effects models stratified by subgroup. Models control for individual and wave fixed effects, receiving Supplemental Nutrition Assistance Program (SNAP) benefits in the month prior to the survey, whether the respondent received unemployment insurance in the past 14 days, whether the respondent has been diagnosed with COVID-19, and employment status at the time of the survey. Standard errors are clustered at the individual level.

**Figure S8.** Two-way fixed effects models with psychological distress (PHQ-4) regressed on vaccination status, stratified by household income, April 2020 to June 2021



Notes: Point estimates and 95% confidence intervals are from separate two-way fixed effects models stratified by subgroup. Models control for individual and wave fixed effects, receiving Supplemental Nutrition Assistance Program (SNAP) benefits in the month prior to the survey, whether the respondent received unemployment insurance in the past 14 days, whether the respondent has been diagnosed with COVID-19, and employment status at the time of the survey. Standard errors are clustered at the individual level.

**Figure S9.** Two-way fixed effects models with psychological distress (PHQ-4) regressed on vaccination status, stratified by self-reported race/ethnicity, April 2020 to June 2021



Notes: Point estimates and 95% confidence intervals are from separate two-way fixed effects models stratified by subgroup. Models control for individual and wave fixed effects, receiving Supplemental Nutrition Assistance Program (SNAP) benefits in the month prior to the survey, whether the respondent received unemployment insurance in the past 14 days, whether the respondent has been diagnosed with COVID-19, and employment status at the time of the survey. Standard errors are clustered at the individual level.

**Table S1.** Timing of data collection and sample sizes for each wave of the Understanding Coronavirus in America

Wave	Date begins	Date close	N (total sample)	N (our sample)
1	3/10/2020	3/31/2020	6,932	—
2	4/1/2020	4/27/2020	5,478	—
3	4/15/2020	5/11/2020	6,287	3,124
4	4/29/2020	5/25/2020	6,403	3,135
5	5/13/2020	6/8/2020	6,407	3,087
6	5/27/2020	6/22/2020	6,408	3,045
7	6/10/2020	7/6/2020	6,346	6,210
8	6/24/2020	7/20/2020	6,077	5,981
9	7/8/2020	8/3/2020	6,289	—
10	7/22/2020	8/17/2020	6,371	6,249
11	8/5/2020	8/31/2020	6,238	6,108
12	8/19/2020	9/14/2020	6,262	6,131
13	9/2/2020	9/28/2020	6,284	6,165
14	9/16/2020	10/12/2020	6,129	6,000
15	9/30/2020	10/26/2020	6,095	5,943
16	10/14/2020	11/9/2020	6,181	6,065
17	10/28/2020	11/23/2020	6,276	6,142
18	11/11/2020	12/7/2020	6,084	5,952
19	11/25/2020	12/21/2020	6,060	5,911
20	12/9/2020	1/4/2021	6,078	5,912
21	12/23/2020	1/18/2021	6,066	5,870
22	1/6/2021	2/1/2021	6,179	6,016
23	1/20/2021	2/15/2021	6,231	6,056
24	2/3/2021	3/1/2021	6,344	6,141
25	2/17/2021	3/29/2021	6,210	6,023
26	3/17/2021	4/27/2021	6,092	5,906
27	4/14/2021	5/25/2021	6,052	5,864
28	5/12/2021	6/22/2021	5,964	5,714

Notes: Waves 1, 2, and 9 excluded from our TWFE and event study models because core study questions were not asked in these periods. Surveys were fielded every 2 weeks until Wave 24 (late February), then every 4 weeks from Wave 25 onwards. Participants are incentivized to respond to the survey on the day they are invited to participate. Recruitment to join the tracking survey was open throughout the period, and panelists joined the survey in after wave 1.

**Table S2:** Descriptive statistics for never vaccinated and vaccinated respondents

	Never vaccinated	Became vaccinated	P- Value
	Percentage	Percentage	
<u>Gender</u>			< 0.001
Female	62%	58%	
Male	38%	42%	
<u>Education</u>			< 0.001
Less than high school	8%	3%	
High school or GED	22%	12%	
Some college	27%	20%	
Assoc. degree	16%	13%	
Bachelor's or higher	28%	52%	
<u>Household Income</u>			< 0.001
\$0-24,999	28%	14%	
\$25,000-49,999	23%	20%	
\$50,000-74,999	19%	19%	
\$75,000 and above	30%	47%	
<u>Age</u>			< 0.001
18-34	28%	13%	
35-54	42%	35%	
55-64	18%	20%	
65+	12%	31%	
<u>Race / Ethnicity</u>			< 0.001
White, non-Hispanic	62%	67%	
Black, non-Hispanic	10%	7%	
AI/AN, non-Hispanic	1%	1%	
API, non-Hispanic	4%	7%	
Other race/mixed, non-Hispanic	5%	4%	
Hispanic/Latino	20%	15%	

Note: Characteristics are unweighted and based on each respondents' last observation in the sample. P-values are from chi-square tests of the bivariate associations between the demographic group and a dichotomous variable that equals 1 if the respondent indicates being vaccinated in any wave of the survey and 0 if never vaccinated. AI/AN = American Indian or Alaska Native. API = Asian or Pacific Islander

**Table S3.** Standardized PHQ-4 scores regressed on health behaviors and financial risk perceptions.

	One day increase in alcohol use per week		10-percentage point increase in perceived risk of running out of money in the next 3 months	
	Coef.	95% CI	Coef.	95% CI
Effect on standardized PHQ-scores	0.01***	0.01,0.02	0.03***	0.03,0.04
Covariates	✓		✓	
Individual fixed effects	✓		✓	
Wave fixed effects	✓		✓	
Constant	0.09***	0.03,0.14	0.03	-0.02,0.08
N. of cases	8,090		8,090	

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Note: standard errors clustered at the individual level.

**Table S4.** Two-way fixed effects models with standardized distress (PHQ-4) regressed on vaccination status and perceived risk factors restricted to the UAS national sample, April 2020 to June 2021 (N= 5,792)

	Model 1		Model 2		Model 3	
	Coef.	95% CI	Coef.	95% CI	Coef.	95% CI
<i>Received</i>						
<i>Vaccination</i>						
<i>(ref: no)</i>	-0.09***	-0.15 to -0.04	-0.09***	-0.15 to -0.04	-0.03	-0.09 to 0.02
Risk of infection					0.04***	0.03 to 0.05
Risk of Hospitalization					0.02**	0.01 to 0.03
Risk of death					0.03***	0.01 to 0.04
Covariates	✓		✓		✓	
Individual fixed effects	✓		✓		✓	
Wave fixed effects	✓		✓		✓	
Constant	2.25***	2.17 to 2.33	2.21***	2.10 to 2.32	2.00***	1.89 to 2.12
N. of cases	5,792		5,792		5,792	

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

**Notes:** Standard errors are clustered at the individual level. Coefficients for perceived risk factors are expressed as a 10-percentage point increase.

**Table S5.** Two-way fixed effects models with standardized distress (PHQ-4) regressed on vaccination status and perceived risk factors among respondents aged 65 and above, April 2020 to June 2021 (N= 1,600)

	Model 1		Model 2		Model 3	
	Coef.	95% CI	Coef.	95% CI	Coef.	95% CI
<b><i>Received Vaccination</i></b> <b><i>(ref: no)</i></b>	-0.04**	-0.08,-0.01	-0.04**	-0.07,- 0.01	-0.03	-0.06,0.00
Risk of infection					0.01***	0.00,0.02
Risk of Hospitalization					0.00	-0.01,0.01
Risk of death					0.01	-0.00,0.01
Covariates	✓		✓		✓	
Individual fixed effects	✓		✓		✓	
Wave fixed effects	✓		✓		✓	
Constant	-0.14***	-0.17,-0.10	-	-0.19,- 0.10	-0.19***	-0.24,-0.14
N. of cases	1,600		1,600		1,600	

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001



**Table S6.** Two-way fixed effects models with standardized distress (PHQ-4) regressed on vaccination status and perceived risk factors adjusting for state-by-wave fixed effects, April 2020 to June 2021

	Model 1		Model 2		Model 3	
	Coef.	95% CI	Coef.	95% CI	Coef.	95% CI
<b><i>Received Vaccination</i></b>						
<b><i>(ref: no)</i></b>	-0.04***	-0.07,-0.02	-	-0.06,-	-0.02	-0.03,0.00
Risk of infection			0.04***	0.02	0.01***	0.00,0.01
Risk of Hospitalization					0.01***	0.01,0.02
Risk of death					0.00*	0.00,0.01
Covariates	✓		✓		✓	
Individual fixed effects	✓		✓		✓	
Wave fixed effects	✓		✓		✓	
Constant	0.08	-0.38,0.53	0.05	-0.41,0.50	0.01	-0.45,0.46
N. of cases	8,090		8,090		8,090	

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

**Table S7.** Two-way fixed effects models with moderate distress (PHQ-4 scores  $\geq 6$ ) regressed on vaccination status and perceived risk factors, April 2020 to June 2021

	Model 1		Model 2		Model 3	
	Coef.	95% CI	Coef.	95% CI	Coef.	95% CI
<b><i>Received Vaccination</i></b> <b>(ref: no)</b>	-0.008*	-0.016,-0.000	-0.008*	-0.016,- 0.000	-0.004	- 0.012,0.004
Risk of infection					0.003***	0.002,0.005
Risk of Hospitalization					0.001	- 0.001,0.003
Risk of death					0.003*	0.001,0.005
Covariates	✓		✓		✓	
Individual fixed effects	✓		✓		✓	
Wave fixed effects	✓		✓		✓	
Constant	0.127***	0.113,0.141	0.122***	0.104,0.140	0.105***	0.086,0.125
N. of cases	8,090		8,090		8,090	

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

**Table S8.** Two-way fixed effects models with severe distress (PHQ-4 scores  $\geq 9$ ) regressed on vaccination status and perceived risk factors, April 2020 to June 2021

	Model 1		Model 2		Model 3	
	Coef.	95% CI	Coef.	95% CI	Coef.	95% CI
<b><i>Received Vaccination (ref: no)</i></b>	-0.010**	-0.016,-0.003	-0.010*	-0.016,-0.003	-0.006*	-0.010,-0.001
Risk of infection					0.003***	0.002,0.004
Risk of Hospitalization					0.000	-0.001,0.001
Risk of death					0.001*	0.000,0.002
Covariates	✓		✓		✓	
Individual fixed effects	✓		✓		✓	
Wave fixed effects	✓		✓		✓	
Constant	0.067***	0.057,0.078	0.065**	0.051,0.078	0.055***	0.045,0.065
N. of cases	8,090		8,090		8,090	

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

**Table S9:** Characteristics of the sample at wave 1 versus the last observation in our final analytic sample

	Characteristics at Wave 1 (no sample restrictions)	Characteristics at final observation in the sample
	Percentage	Percentage
<i>Gender</i>		
Female	59%	59%
Male	41%	41%
<i>Education</i>		
Less than high school	5%	5%
High school or GED	17%	16%
Some college	23%	22%
Assoc. degree	14%	14%
Bachelor's or higher	41%	43%
<i>Income</i>		
\$0-24,999	20%	19%
\$25,000-49,999	21%	21%
\$50,000-74,999	19%	19%
\$75,000 and above	39%	41%
<i>Age</i>		
18-34	21%	19%
35-54	37%	38%
55-64	20%	20%
65+	22%	24%
<i>Race / Ethnicity</i>		
White, non-Hispanic	65%	66%
Black, non-Hispanic	8%	7%
AIAN, non-Hispanic	1%	1%
API, non Hispanic	5%	5%
Other race/mixed	4%	4%
Hispanic/Latino	16%	16%

Note: Characteristics are unweighted. AI/AN = American Indian or Alaska Native. API = Asian or Pacific Islander.

## References

1. Venkataramani AS, Bair EF, O'Brien RL, Tsai AC, Association between automotive assembly plant closures and opioid overdose mortality in the United States: a difference-in-differences analysis JAMA Intern Med 2020 254-262
2. Raifman J, Bor J, Venkataramani A., Association between receipt of unemployment insurance and food insecurity among people who lost employment during the COVID-19 pandemic in the United States JAMA Netw Open 2021
3. Clarke D, Schythe K., Implementing the panel event study IZA Institute of Labor Economics Bonn, Germany 2020