Evaluating preferences and the effect of altruism on COVID-19 vaccine decisions: A discrete choice experiment

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Background

- Three COVID-19 vaccines authorized by the U.S. Food and Drug Administration (FDA) [1]
- Approximately 66.7% of the U.S. population ≥12 years of age are fully vaccinated, but vaccine hesitancy persists [2, 3].
- Current strategies to mitigate vaccine hesitancy largely rely on self-directed motives [4]
  - They may not take altruistic motives into account, which have been shown to influence vaccination decisions [5].

Objectives

- **Aim 1:** To evaluate if willingness to vaccinate is altered by the framing of the vaccination decision as altruistic or not
- **Aim 2:** To elucidate how respondents value COVID-19 vaccine characteristics via discrete choice experiment (DCE)

Key Findings

- Willingness to vaccinate is impacted by altruistic framing, but not in the direction we hypothesized
- Participants demonstrate very strong tradeoff preferences for COVID-19 vaccines

Methods: Instrument Development

- Stated-preference methods consist of questions experimentally designed to obtain patient preferences for hypothetical treatments and estimates of individual attributes [6,7].
- DCEs are comprised of hypothetical choice sets offering two or more treatment alternatives differing in attributes [6,7].
- Vaccine attributes were chosen based on a literature review and levels were calibrated to the three FDA-authorized vaccines

Survey Development

- The survey included:
  - demographic questions
  - shortened self-report altruism scale
  - DCE
- Updated based on focus group (n=10) and pilot study (n=10) feedback
- Final survey administered to 2,004 Mturk respondents in March 2021
  - Randomly assigned to control or experimental framing

	Vaccine A	Vaccine B	No Vaccination
Number of Doses: Number of vaccine doses required for complete immunization.	1 dose	2 doses	N/A
Vaccine Efficacy: By getting vaccinated, you decrease your risk of infection by...	70%	90%	N/A - No additional protection
Risk of severe disease: If you become infected, your risk of severe disease (hospitalization with ventilation) is...	0%	1%	N/A - No additional protection
Severe vaccine side effect: Side effects that are life-threatening or result in hospitalization, surgical intervention, or death. Side effects refer to vaccine safety, not efficacy.	Severe neurological disorder e.g. brain swelling, muscle paralysis, Guillain-Barre Syndrome	Severe allergic reactions e.g. life-threatening skin reaction, facial swelling, difficulty breathing requiring immediate medical attention	N/A
Risk of severe vaccine side effect: The proportion of vaccinated people who suffer severe vaccine side effects.	6 per million vaccinated people	12 per million vaccinated people	N/A
Amount you will be paid: The amount of money you will receive if you complete all doses of the vaccine. The vaccine is free of cost to you.	$200	$0	N/A
	Vaccine A	Vaccine B	No Vaccination
Your choice:	○	○	○

Attributes and Levels

Attributes	Definitions	Attribute Levels
Vaccine doses	Number of vaccine doses required for complete immunization.	• 2 doses • 1 dose
Vaccine efficacy	Efficacy of the vaccine in preventing infections.	• 70% • 90% • 100%
Risk of severe disease	Risk of severe COVID-19 disease once infected.	• 10% • 5% • 0%
Severe vaccine side effect	Side effects that are life-threatening or result in hospitalization, surgical intervention, or death. Severe side effects refer to vaccine safety, not vaccine efficacy.	• Severe neurological disorder • Severe allergic reactions
Risk of severe vaccine side effect	The proportion of vaccinated people who suffer severe vaccine side effects.	• 2 per million vaccinated people • 6 per million vaccinated people • 12 per million vaccinated people
Amount you will be paid	The amount of money you will receive if you complete all doses of the vaccine. The vaccine is free of cost to you.	• $0 • $200 • $1200

Framing

Attribute	Control Framing	Experimental Framing
Vaccine efficacy	By getting vaccinated, you decrease your risk of infection by ___%.	By getting vaccinated, ___ % of people who you encounter will have a decreased risk of infection.
Risk of severe disease	If you become infected, your risk of severe disease (hospitalization with ventilation) is ___%.	If someone you come into contact with becomes infected, their risk of severe disease (hospitalization with ventilation) is ___%.

Methods: Analysis

- **Aim 1:** Applied three logistic regression models to estimate one's willingness to ever, always, and never accept vaccination
  - Independent variables: altruism score, framing, altruism score*framing, age, sex, race and ethnicity, education, household income, and political affiliation

Methods: Analysis

- **Aim 2:** Applied conditional and random parameter (mixed) logit models with an alternative-specific opt-out constant to response data
  - Dependent variable: profile selection
  - Independent variables: attribute levels, framing*opt-out ASC, altruism score*opt-out ASC*framing

Results: Sample Characteristics

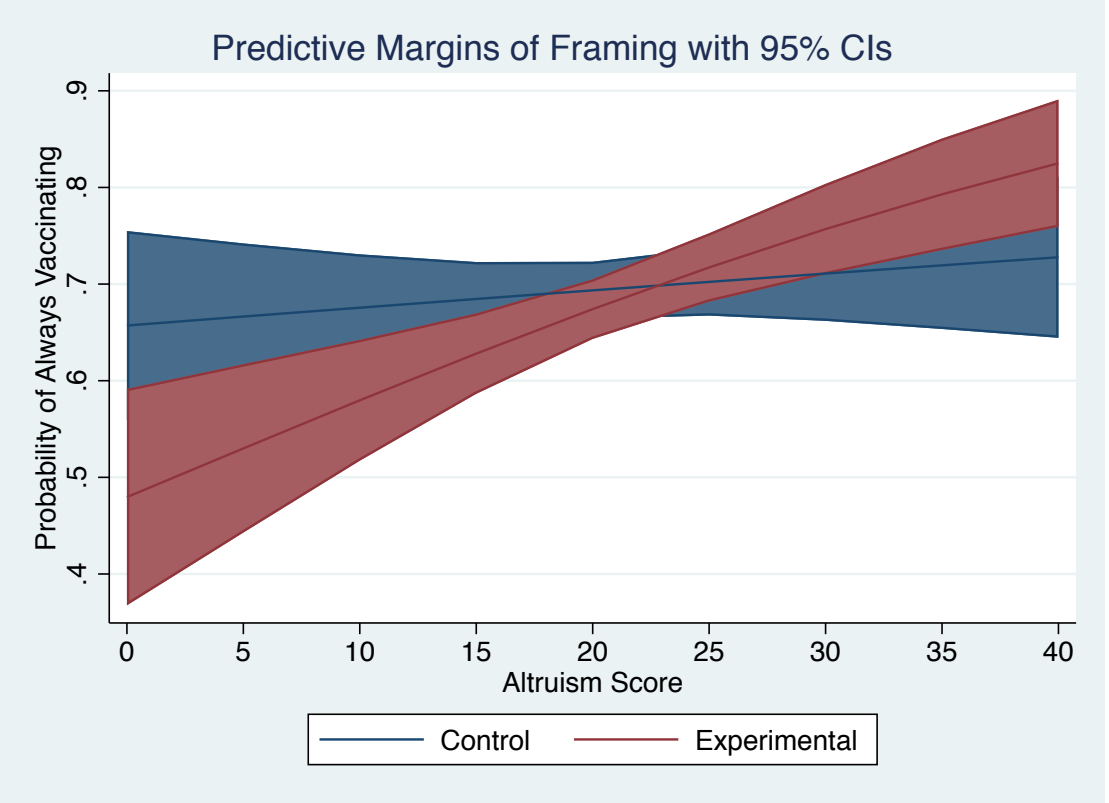
Total	Control	Experimental
N=1,684	N=852	N=832

	p-value comparing control & experimental groups
Age group, categorical	0.42
Sex, categorical	0.83
Race and ethnicity, categorical	0.73
Educational attainment, categorical	0.09
Household poverty level (income as % of FPL), categorical	0.14
Political affiliation, categorical	0.01
Altruism score, continuous	0.58

Aim 1: Willingness to Vaccinate

	Model 1: ever accepted vaccination	Model 2: always accepted vaccination	Model 3: never accepted vaccination
	Odds Ratio (SE)	Odds Ratio (SE)	Odds Ratio (SE)
Altruism score	1.015 (0.93)	1.009 (0.81)	0.985 (-0.93)
Experimental	0.786 (-0.50)	0.440* (-2.34)	1.272 (0.50)
Experimental* altruism score	1.015 (0.67)	1.037* (2.21)	0.985 (-0.67)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

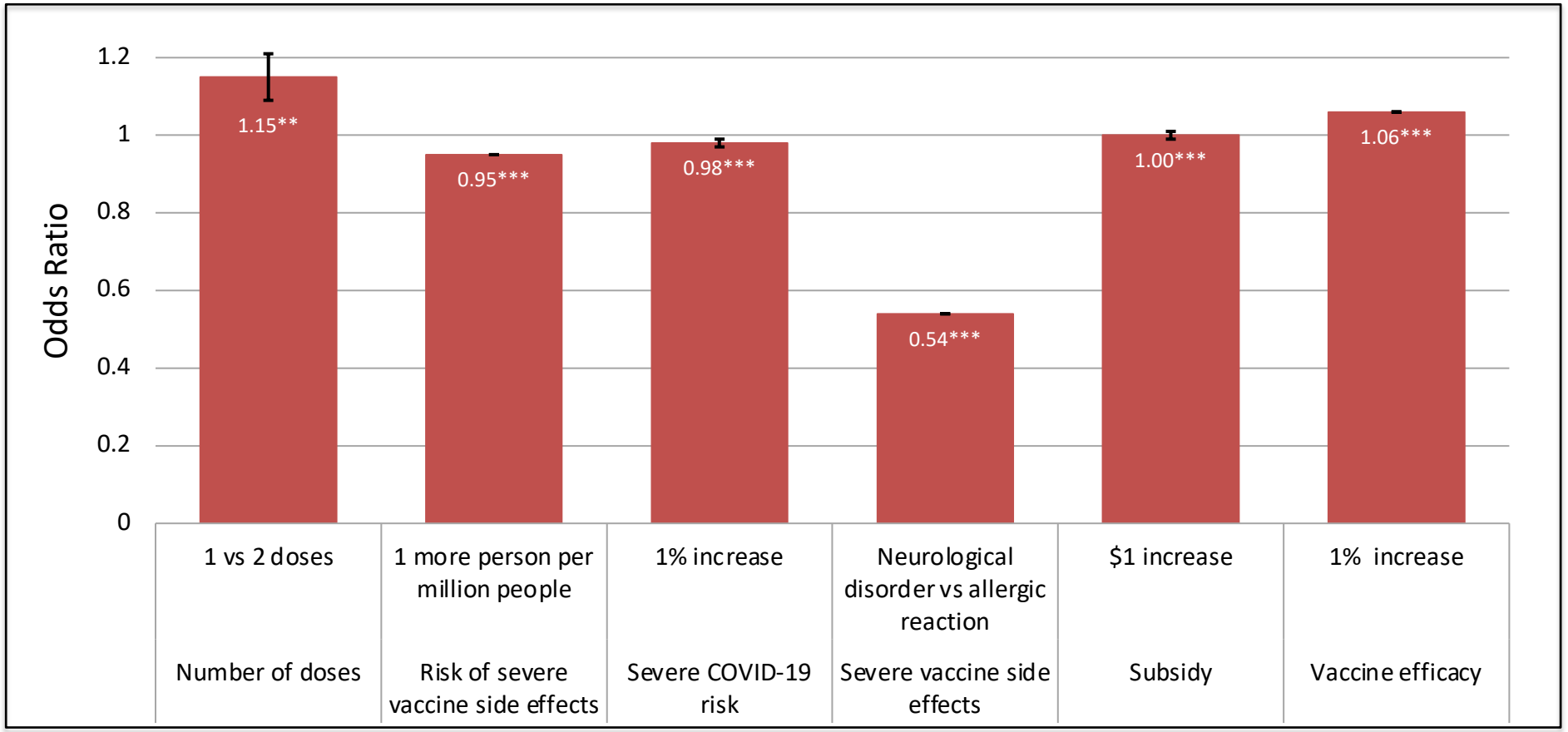


Aim 1: Willingness to Always Vaccinate

	Model 2: always accepted vaccination
	Odds Ratio (SE)
Age (18-24 as reference group)	
25-44	0.464*** (-3.34)
45-64	0.402*** (-3.60)
Sex (Male as reference group)	
Female	0.623*** (-4.06)
Race/Ethnicity (White as reference group)	
American Indian or Alaska Native	0.324** (-2.62)
Household Income (<100% FPL as reference group)	
400%+ FPL	1.516* (2.21)
Political affiliation (Democrat as reference group)	
Republican	0.381*** (-6.71)
Independent	0.365*** (-6.97)
Libertarian	0.190*** (-4.76)
Other	0.471** (-2.81)

* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

Aim 2: DCE



* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

Aim 2: DCE

- All respondents were more likely to choose the opt-out profile than a vaccine (OR: 1.87; $P < 0.05$)
  - Compared to respondents in the control group, respondents in the altruism framing group were much more likely to choose the opt-out profile (OR: 8.24 ; $P < 0.01$)
  - Altruism framing decreased the likelihood of opting out among those with higher altruism scores (OR: 0.89 ; $P < 0.001$)

Conclusions

- More altruistic individuals were more likely to vaccinate with the altruism framing.
- However, the altruism framing discouraged people with lower altruism levels to vaccinate.
- Participants demonstrated very strong tradeoff preferences for COVID-19 vaccines and **the most important attribute was less severe side effects**.

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