Vaccine Hesitancy, State Bias, and Covid-19:
Evidence from a Survey Experiment using Phase-3 Results
Announcement by BioNTech and Pfizer

Supporting Information
Not for print publication

A   Survey questions

Some of the question wordings (age, education, gender, ideology) are taken from the Cooperative Congressional Election Study 2018, which we use to reweight our sample.

- **Age.** "In what year were you born?" Survey-takers were asked to enter the year. For statistical models, the variable was affinely rescaled into the unit interval (based on minimum and maximum ages of 18 and 100, respectively.

- **Education.** "What is the highest level of education you have completed?" Answer options are No high school", "High school graduate", "Some college", "2-year college", "4-year college", and "Post-graduate". This variable is turned into an indicator whether one has completed 4-year college or post-graduate. In the German survey, we ask directly whether or not one has a higher education degree.

- **Gender.** "Are you ..." with options "Male", "Female", and "Other".

- **Ideology.** "In general, how would you describe your own political viewpoint?" Options are "Don't know", "Very liberal", "Liberal", "Moderate", "Conservative", and "Very conservative." Both liberal responses and both conservative responses were aggregated, respectively. In the German survey, we asked people to place themselves on a 1 (left) through 11 (right) ideological scale. Values of 1-4 were labeled "left", and 8-11 "right."

- **Ancestry.** "Please check each country which is part of your ancestry." Among others, in the U.S. survey, "Germany" is included. We code a dummy whether one is of German descent.

- **Feelings toward other country.** "We would like to ask you about your feelings toward several countries. If you have a 'warm' feeling toward one, you have positive associations with the country (100). If you have a "cold" feeling toward one, you have negative associations with the country (0). How do you feel toward each country?" We showed four countries, one of which was always the United States (for Germany survey-takers) or Germany (for U.S. survey-takers). For each, the respondent could move a slider [0; 100]. For the regressions, the variable is affinely rescaled to the unit interval.

- **Fear of COVID-19.** "How afraid are you that Covid-19 will harm you and people close to you?" Likert scale from 1 ("Not at all") through 7 ("Very"). For the regressions, the variable is affinely rescaled to the unit interval.

- **Feelings toward big business.** "Generally speaking, how warm (100) or cold (0) do you feel toward 'big business'?" The respondent could move a slider [0; 100]. For the regressions, the variable is affinely rescaled to the unit interval.

- **Vaccine attitudes.** We showed three statements ("Adults should get all recommended vaccines.", "Recommended vaccines are generally safe.", "Children should get all recommended vaccines."), for each of which survey-takers could express their agreement on a Likert scale (1, "Strongly agree" – 7, "Strongly disagree"). Separately for each country, each variable was normalized (mean zero, unit standard deviation) and added up to create a simple vaccination score, which is labeled "Pro-vaccine" in the statistical models.

The German demographic questions use wordings based off the German Longitudinal Election Study. Further, the German version includes an inquiry about which religious denomination one belongs to. This variable was turned into dummies for Catholic, Evangelical, and Muslim denominations. All others serve jointly as the omitted category.
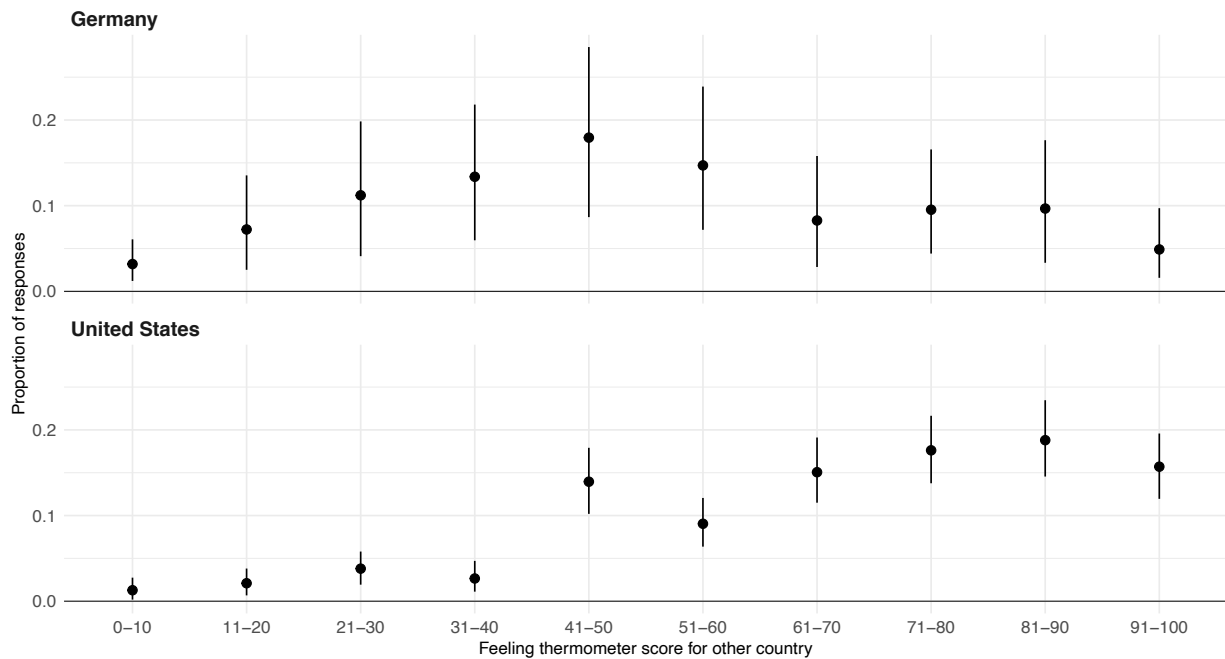
B Distribution of moderator variables

Figure A.1: Feeling thermometer score for the foreign country by survey-country. Summary of reweighted sample's proportion of (binned) feeling thermometer scores for Germany (in U.S., bottom panel) and for the U.S. (in Germany, top panel). Line denotes 95% confidence interval, obtained via non-parametric bootstrap samples.
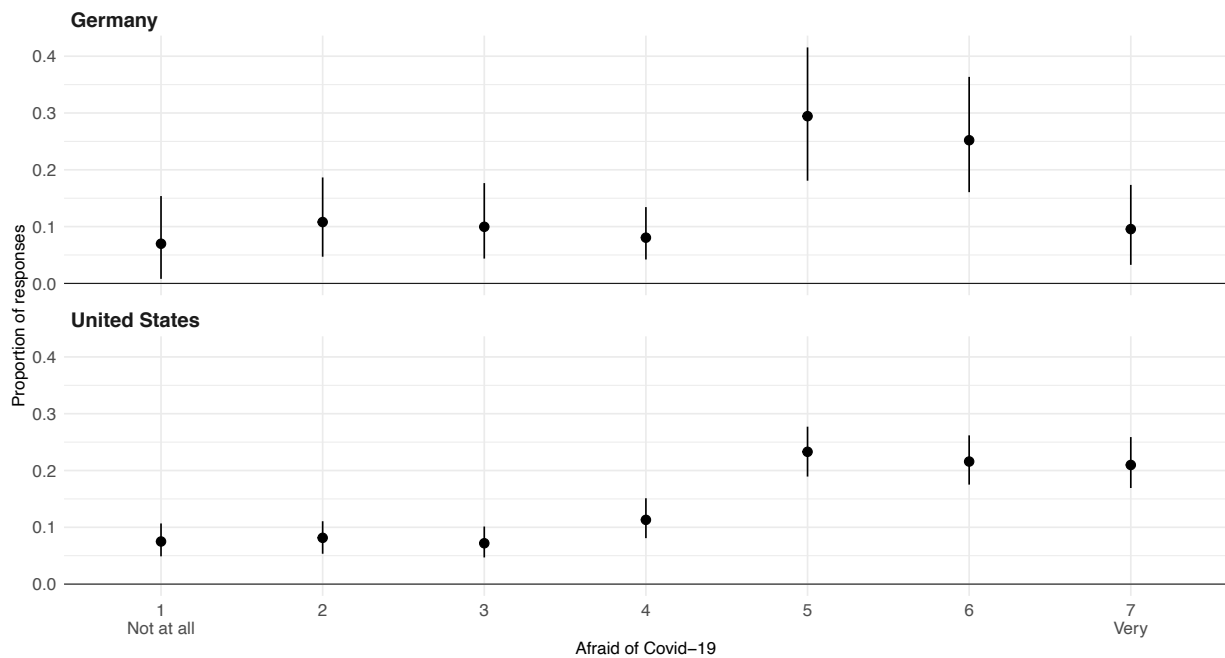

Figure A.2: Afraid of Covid-19 responses. Figure is constructed analogously to Figure A.1.

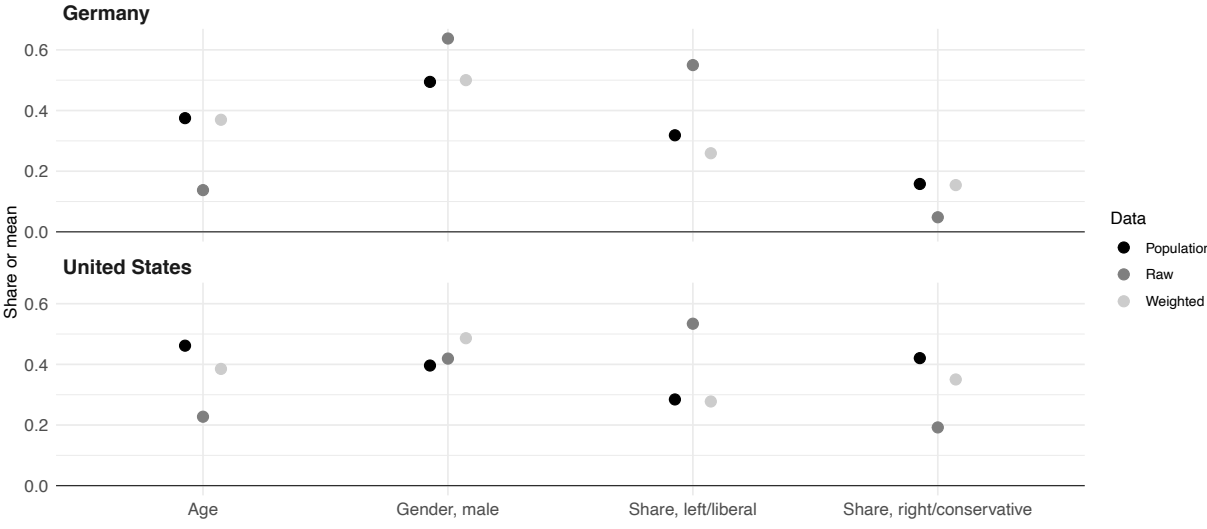# C   Balance vis-à-vis population

Figure A.3: Sample and population. Each panel gives the raw sample's mean or proportion for the variable on the x-axis (dark gray circle), the reweighted sample's (light gray), and the target populations' (black).

D   Tables for treatment moderation models

	All		Drop 'Never'	
	Vaccine, domestic	**Vaccine, foreign**	**Vaccine, domestic**	**Vaccine, foreign**
Age	-2.91	-4.73	0.04	0.10
	(-7.89, 0.11)	(-7.21, -2.44)	(-1.27, 1.28)	(-1.41, 1.78)
Gender, male	-0.76	-0.45	0.02	-0.50
	(-2.02, 0.41)	(-1.11, 0.23)	(-0.29, 0.34)	(-0.82, -0.17)
Education, university	-0.17	-0.50	0.30	-0.18
	(-1.30, 1.01)	(-1.35, 0.28)	(0.01, 0.61)	(-0.53, 0.19)
Ideology, left/liberal	-0.25	0.06	0.00	-0.11
	(-1.46, 1.22)	(-0.81, 0.92)	(-0.33, 0.34)	(-0.47, 0.26)
Ideology, right/conservative	-0.45	-1.01	-0.36	-0.66
	(-1.90, 0.85)	(-2.40, 0.15)	(-0.94, 0.16)	(-2.23, 0.42)
Pro-vaccine	-0.49	-0.94	-0.53	-0.69
	(-1.17, 0.08)	(-1.52, -0.47)	(-0.71, -0.37)	(-0.86, -0.52)
Feeling, business	-1.32	-0.84	-0.06	0.18
	(-3.58, 0.95)	(-2.77, 1.05)	(-0.71, 0.61)	(-0.66, 1.02)
Afraid of Covid	-1.19	-1.28	-0.19	-0.61
	(-3.31, 0.92)	(-2.47, -0.19)	(-0.79, 0.40)	(-1.22, 0.01)
Feeling, other country	0.65	0.12	0.28	0.36
	(-1.75, 2.87)	(-1.47, 1.46)	(-0.39, 0.96)	(-0.34, 1.07)
Religion, Catholic	-0.48	1.53	-0.66	0.52
	(-2.14, 1.54)	(-0.28, 3.16)	(-1.33, 0.06)	(-0.40, 1.60)
Religion, Evangelical	0.47	0.41	-0.02	0.65
	(-1.14, 2.43)	(-0.98, 1.99)	(-0.74, 0.68)	(-0.29, 1.77)
Religion, Muslim	-0.67	0.04	-0.27	0.56
	(-2.68, 1.60)	(-1.78, 1.97)	(-1.27, 0.71)	(-0.40, 1.70)
Intercept	7.33	6.82	4.84	4.64
	(3.99, 11.10)	(4.49, 9.12)	(3.91, 5.72)	(3.47, 5.79)
Scale	0.93	0.78	1.07	1.00
	(0.64, 1.27)	(0.56, 1.02)	(0.96, 1.18)	(0.89, 1.11)
Observations	294	288	286	274

Table A.1: Treatment moderation models, Weibull interval censored model; Germany. Each estimate shows results for a different model by country and sample. The first number gives the mean estimate, the range below the 95% confidence interval. Uncertainty comes from 2,000 non-parametric bootstrap replications.

	All		Drop 'Never'	
	Vaccine, domestic	**Vaccine, foreign**	**Vaccine, domestic**	**Vaccine, foreign**
Age	-0.94	-0.74	0.02	-0.11
	(-2.16, 0.14)	(-2.18, 0.60)	(-0.94, 0.94)	(-0.93, 0.72)
Gender, male	-1.00	-0.72	-0.67	-0.74
	(-1.47, -0.54)	(-1.18, -0.24)	(-0.99, -0.34)	(-1.04, -0.42)
Education, university	-0.26	-0.10	0.05	-0.13
	(-0.70, 0.19)	(-0.57, 0.36)	(-0.22, 0.34)	(-0.43, 0.16)
Ideology, don't know	-0.47	1.81	0.22	0.24
	(-1.72, 0.53)	(-0.18, 3.91)	(-0.77, 1.02)	(-0.89, 1.05)
Ideology, left/liberal	0.11	-0.54	0.09	-0.36
	(-0.35, 0.60)	(-1.05, 0.00)	(-0.26, 0.46)	(-0.70, 0.01)
Ideology, right/conservative	0.50	0.07	-0.01	-0.21
	(-0.18, 1.17)	(-0.55, 0.71)	(-0.54, 0.50)	(-0.69, 0.28)
Pro-vaccine	-0.96	-0.92	-0.75	-0.68
	(-1.30, -0.66)	(-1.17, -0.68)	(-0.98, -0.55)	(-0.86, -0.51)
Feeling, business	-0.78	-0.42	-0.50	0.07
	(-1.73, 0.20)	(-1.52, 0.69)	(-1.10, 0.08)	(-0.59, 0.71)
Afraid of Covid	-0.84	-0.40	-0.18	0.08
	(-1.87, 0.19)	(-1.26, 0.40)	(-0.82, 0.49)	(-0.60, 0.74)
Feeling, other country	-0.43	-0.51	-0.71	-0.27
	(-1.52, 0.75)	(-1.68, 0.65)	(-1.49, 0.14)	(-0.94, 0.42)
German ancestry	0.06	0.04	-0.22	-0.03
	(-0.44, 0.59)	(-0.43, 0.47)	(-0.53, 0.08)	(-0.35, 0.28)
Intercept	6.57	6.33	5.62	5.32
	(5.40, 7.82)	(5.30, 7.44)	(4.73, 6.45)	(4.66, 5.97)
Scale	1.17	1.21	1.10	1.08
	(0.99, 1.33)	(1.05, 1.38)	(0.99, 1.21)	(0.97, 1.20)
Observations	309	352	287	323

Table A.2: Treatment moderation models, Weibull interval censored model; United States.
Each estimate shows results for a different model by country and sample. The first number gives the
mean estimate, the range below the 95% confidence interval. Uncertainty comes from 2,000 non-parametric
bootstrap replications.
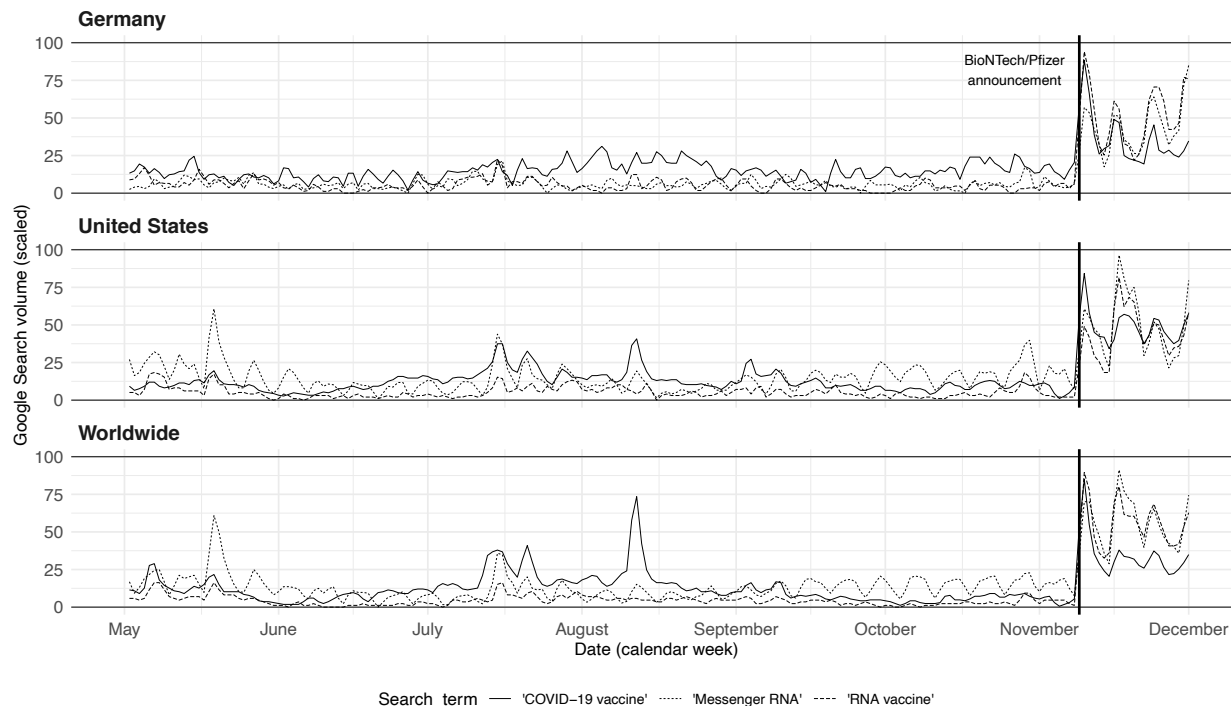
E   Google search volumes for Covid-19

Figure A.4: Google search volumes for Covid-19/ vaccine terms. Each panels show the relative search volumes for a different geographic area from where searches originate. The line type indicates the search terms (COVID-19 Vaccine, Messenger RNA, RNA vaccine). Each time series is scaled to a minimum/ maximum of 0 and 100. The vertical line on November 9, 2020 indicates the announcement of the BioN-Tech/Pfizer vaccine Phase 3 results. The figure shows (1) interest in COVID-19 vaccines in Germany, the United States, and the world, was low during Summer 2020; (2) with the BioNTech/Pfizer announcement, interest spiked; (3) interest in "RNA vaccine" and "Messenger RNA", the type and technology of the first viable vaccine, has remained substantially elevated after the BioNTech/Pfizer announcement.