

Supplementary Data

Supplementary Table S1. Characteristics of patients by type of dataset (Imputed vs. Non-Imputed)

Variables	Imputed ^a (N=1,793)	Non-Imputed ^b (N=1,793)
	n (%) or mean \pm SD	n (%) or mean \pm SD
Age	52.2 \pm 16.9	52.2 \pm 16.9
Sex		
Female	1051 (58.6)	1024 (58.5)
Male	742 (41.4)	727 (41.5)
Role		
Patient	820 (45.7)	795(45.8)
Healthcare professional	542 (30.2)	524 (30.2)
Family Member	228 (12.7)	220 (12.7)
Other	203 (11.3)	195 (11.2)
Vulnerable population^c		
No	1377 (76.8)	1332 (85.1)
Yes	416 (23.2)	234 (14.9)
Education		
Some High-School or Less	106 (5.9)	106 (6.0)
High-School Graduate	260 (14.5)	258 (14.5)
Technical/Vocational Training	419 (23.4)	412 (23.2)
Bachelor's Degree or Above	1008 (56.2)	1000 (56.3)
Employment		
No	287 (16.0)	286 (16.1)
Yes	1116 (62.2)	1102 (62.0)
Retired	390 (21.8)	389 (21.9)
Living...		
Alone	405 (22.6)	370 (21.1)
With healthy adults	611 (34.1)	611 (34.8)
With susceptible people ^d	353 (19.7)	350 (19.9)
With high-risk people ^e	424 (23.6)	424 (24.2)
Immunosuppressed		
No	1433 (79.9)	1429 (80.5)
Yes - rheumatic disease	191 (10.7)	183 (10.3)
Yes - other ^f	169 (9.4)	163 (9.2)
Cancer		
No	1523 (84.9)	1517 (85.0)

Yes	270 (15.1)	268 (15.0)
Hypertension		
No	1431 (79.8)	1420 (80.5)
Yes	362 (20.2)	344 (19.5)
Diabetes mellitus		
No	1600 (89.2)	1593 (90.4)
Yes	193 (10.8)	169 (9.6)
Kidney disease		
No	1764 (98.4)	1756 (98.4)
Yes	29 (1.6)	29 (1.6)
Smoking		
No	1641 (91.5)	1623 (91.5)
Yes	152 (8.5)	150 (8.5)
Previous influenza vaccine		
No	197 (11.0)	192 (10.8)
Yes	1596 (89.0)	1588 (89.2)
Previously rejected influenza vaccine		
No	1680 (93.7)	1649 (93.9)
Yes	113 (6.3)	108 (6.1)
Previous COVID-19 diagnosis		
No	1749 (97.5)	1741 (97.5)
Yes	44 (2.5)	44 (2.5)
Perception of receiving enough information about COVID-19 prevention		
No	95 (5.3)	89 (5.0)
Yes	1698 (94.7)	1689 (95.0)
COVID-19 vaccine compulsory		
No	217 (12.1)	215 (12.2)
Yes	1011 (56.4)	995 (56.4)
Not Sure	565 (31.5)	555 (31.4)
Trust that the government is making decisions in citizens' best interest regarding COVID-19 vaccines		
No	165 (9.2)	146 (8.6)
Yes	1628 (90.8)	1557 (91.4)
Access barrier to vaccination would prevent participants from receiving a COVID-19 vaccine⁹		
No	1280 (71.4)	1246 (76.2)
Yes	513 (28.6)	389 (23.8)

Trust pharmaceutical companies to provide safe and effective COVID-19 vaccines		
No	89 (5.0)	81 (4.7)
Yes	964 (53.8)	937 (54.0)
Not Sure	740 (41.3)	718 (41.4)
Concerns that a future COVID-19 vaccine might not be safe		
Not concerned at all	464 (25.9)	437 (25.2)
A little concerned	1206 (67.3)	1185 (68.4)
Very concerned	123 (6.9)	110 (6.4)
Vaccine benefits outweigh its risks		
No	54 (3.0)	47 (2.7)
Yes	1386 (77.3)	1364 (78.6)
Not Sure	353 (19.7)	324 (18.7)
Social pressure to receive a COVID-19 vaccine in the future		
No	1174 (65.5)	1153 (66.3)
Yes	366 (20.4)	349 (20.1)
Not Sure	253 (14.1)	238 (13.7)
Language		
English	1185 (66.1)	1185 (66.1)
French	608 (33.9)	608 (33.9)
Risk-taking behaviour		
Low (≤ 26.67)	634 (35.4)	580 (33.4)
Moderate (26.68 - 38.33)	503 (28.1)	503 (28.9)
High (≥ 38.34)	656 (36.6)	655 (37.7)

^aMissing data were imputed using multiple imputation

^bResults presented for individuals with available data

^cIndigenous people, African American and Latin

^dAdult older than 65 years, individual with chronic disease, or infant <6 months old.

^eChild who goes to elementary school or young adult

^fHIV, inflammatory bowel disease, cancer, and transplant

^gDistance to the vaccine provider, time needed to get to the vaccine provider, waiting time at the vaccine provider, cost/parking in getting to the vaccine provider, and effort of traveling to the vaccine provider

Supplementary Table S2. Multivariate analysis of factors associated with vaccine hesitancy (non-hesitancy as reference group) – Reduced/Parsimonious Model (Backward Elimination)

Level of Hesitancy to Receive COVID-19 Vaccine	aOR* (95%CI)
Significant hesitant (scores 0-7)	
Education	
Some high school or less	3.17 (1.66 - 6.07)
High school graduate	1.77 (1.11 - 2.83)
Technical/vocational training	1.48 (1.00 - 2.18)
Bachelor's degree or above	Ref
Living with...	
Young children	1.67 (1.05 - 2.65)
Susceptible people ^a	1.38 (0.83 - 2.27)
Healthy adults	1.03 (0.66 - 1.60)
Alone	Ref
Immunosuppressed	
Yes – other ^b	0.70 (0.39 - 1.25)
Yes – rheumatic disease	1.73 (1.06 - 2.81)
No	.
Diabetes mellitus	
Yes	1.52 (0.89 - 2.60)
No	Ref
Perception of receiving enough information about COVID-19 prevention	
No	2.33 (1.18 - 4.61)
Yes	Ref
COVID-19 vaccine compulsory	
No	18.22 (11.07 - 29.99)
Unsure	12.03 (8.06 -17.94)
Yes	Ref
Trust that the government is making decisions in citizens' best interest regarding COVID-19 vaccines	
No	1.59 (0.95 - 2.66)
Yes	Ref
Trust pharmaceutical companies to provide safe and effective COVID-19 vaccines	
No	4.16 (2.03 - 8.53)
Unsure	3.13 (2.17 - 4.51)

Yes	Ref
Concerns that a future COVID-19 vaccine might not be safe	
Very concerned	7.39 (3.51 -15.54)
A little concerned	2.01 (1.22 - 3.31)
Not concerned at all	Ref
Vaccine benefits outweigh its risks	
No	3.31 (1.46 - 7.52)
Unsure	4.12 (2.80 - 6.06)
Yes	Ref
Social pressure to receive a COVID-19 vaccine in the future	
Yes	1.18 (0.78 - 1.78)
Unsure	2.24 (1.45 - 3.48)
No	Ref
Mild hesitancy (scores 7.1-9.5)	
Education	
Some high school or less	1.76 (0.95 - 3.26)
High school graduate	1.19 (0.77 - 1.83)
Technical/vocational training	1.46 (1.04 - 2.05)
Bachelor's degree or above	Ref
Living with...	
Young children	1.48 (0.98 -2.24)
Susceptible people ^a	1.17 (0.75 -1.83)
Healthy adults	1.38 (0.94 - 2.01)
Alone	Ref
Immunosuppressed	
Yes – other ^b	0.71 (0.42 -1.18)
Yes – rheumatic disease	1.20 (0.76 -1.90)
No	Ref
Diabetes mellitus	
Yes	1.60 (1.01 - 2.52)
No	Ref
Perception of receiving enough information about COVID-19 prevention	
No	2.85 (1.59 - 5.11)
Yes	Ref
COVID-19 vaccine compulsory	
No	4.12 (2.61 - 6.52)
Unsure	4.99 (3.65 - 6.82)
Yes	Ref

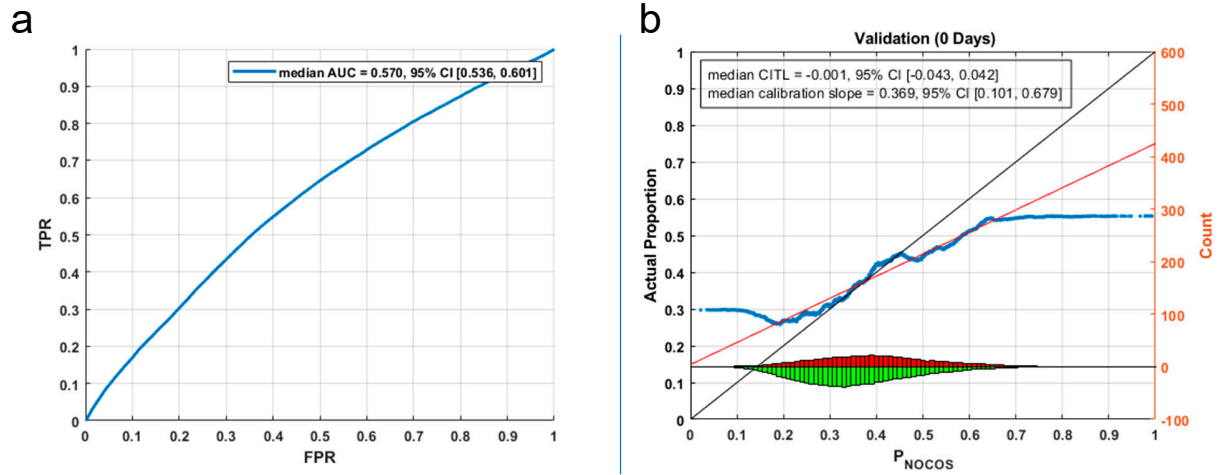
Trust that the government is making decisions in citizens' best interest regarding COVID-19 vaccines	
No	0.80 (0.46 - 1.40)
Yes	Ref
Trust pharmaceutical companies to provide safe and effective COVID-19 vaccines	
No	1.84 (0.90 - 3.74)
Unsure	1.36 (1.00 - 1.84)
Yes	Ref
Concerns that a future COVID-19 vaccine might not be safe	
Very concerned	2.68 (1.17 - 6.11)
A little concerned	3.05 (2.01 - 4.64)
Not concerned at all	Ref
Vaccine benefits outweigh its risks	
No	0.30 (0.07 - 1.31)
Unsure	1.73 (1.18 - 2.54)
Yes	Ref
Social pressure to receive a COVID-19 vaccine in the future	
Yes	1.83 (1.31 - 2.57)
Unsure	2.14 (1.42 - 3.21)
No	Ref

*aOR: Adjusted Odds Ratio. Adjustment was done for all variables shown in the table. Variable selection was done using stepwise backward elimination

^aAdult older than 65 years, individual with chronic disease, or infant <6 months old.

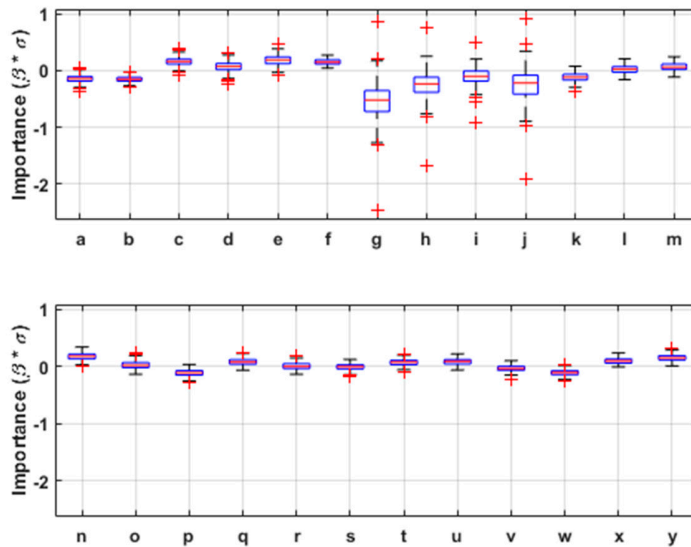
^bHIV, inflammatory bowel disease, cancer, and transplant

Supplementary Figure S1. Machine learning model (including only demographic information).



(a) ROC curve discriminative performance of the logistic regression machine learning model comparing no hesitancy with combined mild hesitancy and significant hesitancy. The median AUC and 95% CI is reported;
(b) Calibration performance of the machine learning model.

Supplementary Figure S2. Machine learning correlates of vaccine hesitancy (including only demographic information).



Boxplots of out-of-sample factor importance (adjusted odds ratio * standard deviation) from a single imputation and 200 repetitions of bootstrap resampling for logistic regression models that correlate with significant or some hesitancy vs. no hesitancy.

^aAge; ^bSex (male); ^cRole (family member); ^dRole (health care professional); ^eRole (patient); ^fPart of a vulnerable population (yes); ^gHighest level of education (bachelor's degree or above); ^hHighest level of education (high school graduate); ⁱHighest level of education (some high school); ^jHighest level of education (technical/vocational training); ^kEmployment (retired); ^lEmployment (yes); ^mLiving with (healthy adults); ⁿLiving with (high risk people); ^oLiving with (susceptible people); ^pImmunosuppression (yes - other); ^qImmunosuppression (yes - rheumatic disease); ^rCancer (yes); ^sHypertension (yes); ^tDiabetes mellitus (yes); ^uKidney disease (yes); ^vSmoke (yes); ^wPrevious influenza vaccine (yes); ^xPrevious COVID-19 infection (yes); ^yLanguage (English)