Profiles of US Hispanics Unvaccinated for COVID-19

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Abstract

Background The COVID-19 pandemic has disproportionately impacted Hispanics in the USA with increased rates of SARS-CoV-2 infections, hospitalizations, and deaths. The objective of this report was to characterize the demographics and beliefs of unvaccinated Hispanics to help address their concerns that lead to vaccine hesitancy.

Methods Of 1,011 potential participants from a national online panel, 22.3% ($N = 225$, 51.6% female, age = 40.5) met inclusion criteria of Hispanic adults and not receiving at least one dose of the COVID-19 vaccine. The 30-item survey included items about demographics, political affiliations, sources of news (e.g., Fox vs. CNN), reasons for being unvaccinated, and ratings (0 = strongly disagree, 100 = strongly agree) of 10 controversial statements regarding COVID-19.

Results Over three-fifths (62.6%) identified side effects and safety concerns, while almost one-third (30.5%) cited a lack of efficacy as their top reasons for being unvaccinated. Agreement to "The developers of the COVID-19 vaccine rushed the development and cut corners" was rated the highest (63.22) which was significantly ($p < .001$) higher than the other nine statements (e.g., "The COVID-19 vaccine does not work"). Many vaccine attitudes differed significantly by political party affiliation and some by gender and news source. Republicans (59.9 ± 4.2) scored higher than Democrats (38.5 ± 4.2, $p \leq .001$) to "If I've already had COVID-19, I don't need the vaccine."

Conclusions This study identified the heterogeneity in COVID-19 vaccine attitudes among Hispanics. Further research is needed to determine if the subgroups identified are differentially receptive to interventions to facilitate reconsideration of prior vaccination decisions.

Keywords Infectious disease · Gender · News · Political ideology

Although the coronavirus disease 2019 (COVID-19) pandemic has affected everyone, the disease burden in the USA has disproportionately impacted minorities. A systematic review determined that Hispanic populations had a 1.3 to 7.7 times greater risk for a positive severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA-PCR relative to non-Hispanic White populations.[1] Moreover, Hispanic or Latino individuals were 2.7- to 4.4-fold more likely to be hospitalized due to COVID-19 and 2.8-fold more likely to die from the disease, relative to non-Hispanic Whites [1–3].

Further, more years of life were lost due to COVID-19 before age 65 among the Hispanic and non-Hispanic Black populations than Whites, despite the smaller size of these groups [3]. However, vaccination rates of Hispanics in August of 2021 lagged relative to Whites in 34 of the 40 states reporting ethnicity [4]. For example, one-third (33%) of Hispanics versus two-thirds of Whites (64%) had received a COVID-19 vaccine dose by the summer of 2021 in Arizona [4].

Vaccination decisions are complex and impacted by a variety of cultural, demographic, sociopolitical, religious, and economic factors [4–13]. A scoping review of ninety-two studies from high-income countries determined that the risk for vaccine hesitancy was the highest for those of non-White ethnicity, younger age, females, lower education, lack of recent history of receiving the influenza vaccination, decreased perceived risk of contracting COVID-19, and not having chronic medical conditions [10]. Similarly, an online study with a national sample ($N = 1,878$) conducted in 2020 determined that Hispanics, those with children at

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home, rural residents, and people identifying politically as Republicans were less likely to be vaccinated [11]. Phone interviews of Medicare patients completed in the fall of 2020 revealed that those whose primary information source was social media had lower perceptions of COVID-19 disease severity and lower likelihood of getting vaccinated [12]. Four out of five (79.9%) Hispanic/Latino women who were pregnant were unvaccinated for COVID-19. [13].

As the 62.1 million Hispanics constitute the largest minority in the USA [14], the objectives of this investigation were to extend upon past research [9, 11] to further characterize Hispanics who were unvaccinated for COVID-19 up to August 1, 2021.

Methods

Procedures Potential participants received an invite from SurveyMonkey between July 14 and August 1, 2021. The survey was hosted on this survey firm's panel which has 2.5 million daily respondents who are compensated ($0.25–0.50/survey). The recruitment and survey were conducted in English. Inclusion criteria were identification as Hispanic, adult (age ≥ 18), and a negative response to "Have you received at least one dose of the COVID-19 vaccine, from any maker?" There were six items about demographics (age, gender, ethnicity, income, education, political affiliation). There were ten statements and misconceptions, e.g., "The COVID-19 vaccine will make me infertile," selected based on research [15–17], and the extent of agreement was rated on a 100-point scale. There were six items targeting domains potentially related to vaccine hesitancy including sources of news, future presidential voting preference, vaccination status of others, and perceived ages where the COVID-19 vaccine benefits exceeded the risk. Pilot testing was completed by sending an electronic copy to interested parties. The full instrument including the five standard Survey Monkey demographic items is available in the Supplemental Appendix. The CHERRIES was followed for reporting [18]. Procedures were deemed exempt by the Institutional Review Board of Geisinger in Danville, Pennsylvania.

Data Analysis Statistical analysis was completed with Systat, version 13.1. Figures were prepared with GraphPad Prism, version 6.07, with variability depicted as the SEM. When the "prefer not to disclose" option was selected, these participants were removed from the denominator for percentage calculations for that question. Associations between the ten COVID-19 statement ratings were determined with Pearson correlations. Cronbach's alpha was used for internal consistency and principal component analysis for the ten statements. A $p < 0.05$ was considered statistically significant

although analyses that met more conservative cutoffs (e.g., $p < 0.0005$) were noted.

Results

Participant Characteristics There were 1,011 potential participants (48.06% female, 42.60% age 18–44, and 15.41% age ≥ 61; 53.80% with an annual income < $50 K; 22.87% Pacific, 21.62% South Atlantic, and 19.96% West South Central Census Regions), with 225 (22.26%) meeting the inclusion criteria of not receiving a COVID-19 vaccine.

Half (51.6%) of the sample were female, age = 40.48, SD = 14.93, min = 18, and max = 83. Half of respondents selected Mexico (47.91%) followed by Puerto Rico (19.53%) and Cuba (6.05%) to "I or my family is ethnically from one or more of the following countries?" Geographically, the Census regions represented included the South Atlantic (25.25%), Pacific (23.27%), West South Central (18.32%), and Middle Atlantic (11.39%) regions. Half (48.37%) had a personal annual income ≤ $40 K. The education of half (49.76%) was high school or less. The political affiliation was approximately evenly divided between Democratic (31.76%), Republican (31.18%), and Independent (30.59%). The mean response to "If the election were held today, how likely would you vote for Donald Trump or Joe Biden?", with Biden = 0 and Trump = 100, was 47.51 (SD = 38.89). Three-fifths (61.43%) selected "does not apply to me" to "Within the past month, how often have you attended in-person or virtual religious services?" Fox (51.46%), traditional broadcasters (ABC, CBS, and NBS = 51.46%), social media (46.20%), CNN (45.03% including CNN en Español = 11.11%), the local newspaper (15.79%), and Telemundo (15.79%) were each selected as among the top three primary sources of news (Supplementary Fig. 1). Half (50.0%) of CNN viewers also listed Fox among their top three.

Reasons for Non-vaccination Table 1 shows a ranking for the top three reasons for not receiving the COVID-19 vaccine. Over three-fifths endorsed concern about side effects and safety. Three out of ten indicated that they do not believe it will protect them from COVID-19. Over one-quarter did not believe it was necessary because they had a prior COVID-19 diagnosis or suspected one. One out of eleven reported a medical exemption. Religious beliefs were endorsed by one-ninth. Logistical issues like cost, transportation to the vaccination site, obtaining time off work, or difficulty signing up for a vaccination were each selected by less than 8%. Among the eighteen participants that elected to provide an "other" reason, these were varied and included "allergy" or "autoimmune disease" (three responses), "believe it's a placebo," "don't like needles," "pregnant," "I have a healthy

Table 1 Ranking of responses to "What are your top three reasons for not receiving the COVID-19 vaccine?" among US Hispanics

	Percent
1. Concerned about side effects	62.57%
2. Safety concerns about vaccine contents	62.57%
3. Don't believe it will protect me from COVID-19	30.48%
4. Don't believe it is necessary (previously COVID-diagnosed)	16.58%
5. Most everyone else around me has received the vaccine	16.04%
6. Religious beliefs	11.23%
7. Don't believe it is necessary (suspect previous COVID-19)	10.16%
8. Medical exemption	9.09%
9. Cost	7.49%
10. Lack of transportation to vaccination site	5.88%
11. Difficulty getting time off work	5.35%
12. Don't know how to sign up for a vaccination	5.35%

body," "I just don't want to," or "haven't had a reason to." Further analyses of these top three reasons by political affiliation may be found in Supplemental Table 2.

The response to "How likely would you be to take the COVID vaccine if it were a pill?" with options ranging from 0 to 100% were generally low (mean = 32.01%, SD = 34.41%, median = 16.50%) but higher for Democrats (44.36%, SD = 34.08) than Republicans (24.37%, SD = 30.33, $t(103) = 3.17$, $p < 0.005$). Independents (30.89, SD = 35.61) were less likely than Democrats ($t(103) = 1.98$, $p \leq 0.05$).

Social contributions to vaccine hesitancy were investigated by asking "How many of the 30 people you interact with (non-virtually) the most each week (your bubble) have received the COVID vaccine?" with options from 0 to 100% were intermediate (mean = 39.23%, SD = 29.46, median = 42.50). Males (43.24%, SD = 29.13) indicated that more of their interactions were with vaccinated people than females (33.85%, SD = 27.81, $t(200) = 2.34$, $p < 0.05$). The subsequent question was "How likely would you be to receive the vaccine if the majority of your bubble received the vaccine?" produced a modest value (mean = 30.89%, SD = 32.45, median = 19.00) with 29.72% of participants selecting 0%. Males (38.82%, SD = 32.63) were higher than females (22.86%, SD = 29.52, $t(200) = 3.65$, $p < 0.0005$). Democrats (43.04%, SD = 31.52) were elevated relative to Republicans (27.19%, SD = 30.86, $t(103) = 2.60$, $p < 0.05$) and also Independents (24.39%, SD = 30.83, $t(103) = 3.07$, $p < 0.005$).

Age and Subgroup Dependency of Vaccination Overall, the responses to "For what ages and groups do the COVID-19 vaccine benefits exceed the risks or side effects?" were age-dependent with less than one-fifth endorsing vaccination for

minors (newborns and age 1–4, 17.22%; age 5–11, 15.31%; age 12–17, 16.75%) which then gradually increased (18–29, 24.4%; 30–49, 32.06%; 50–64, 39.71%) with the highest values for the elderly (≥ 65, 49.28%). Vaccination of pregnant woman was favored by slightly over one-fifth (21.05%).

COVID-19 Beliefs and Misconceptions Ten controversial COVID statements were ranked on a 0 (strongly disagree) to 100 (strongly agree) scale. Figure 1 shows that the belief that "The developers of the COVID-19 vaccine rushed the development and cut corners" was rated the highest (63.22) which was significantly ($p < 0.001$) higher than the other nine statements. The only other statement to score greater than 50 (i.e., neutral) was "The COVID-19 vaccine does not work" (51.04) which was rated significantly ($p < 0.05$) higher than statements in the fourth to tenth rank. The third highest ranking (48.13) was for "If I've already had COVID-19, I don't need the vaccine" which had a significantly ($p < 0.05$) elevated score relative to statements ranked fifth and below. The participants ($N = 34$) facing at least one logistical barrier to vaccination (cost, transportation, difficulty with signing up, or time off work) rated the degree that the COVID-19 vaccine was rushed (46.9, SD = 28.8) significantly lower than others (65.2, SD = 31.5, $t(207) = 3.14$, $p < 0.005$).

Table 2 shows generally moderate ($r = 0.3$ to 0.6) correlations among these statements with the partial exception of "I only need the vaccine if I want to travel out of the country." The internal consistency of these ten items was 0.874 which showed only a modest improvement (0.883) with the travel item removed. An exploratory principal component analysis was completed. The first two components accounted for 47.85% and 12.20%, respectively, of the variance. The first-component constituted all items except for "travel" which had a high-negative loading on the second component (Supplemental Table 2). Further analyses by demographic variable showed that the two-component model was retained with the sample broken down by gender (Supplemental Table 3) and education (Supplemental Table 4). However, examination by political party affiliation supported a three-component model for Republicans. The third component had a high-negative loading for infertility (Supplemental Table 5).

A total score for agreement to these ten controversial COVID-19 statements was created which was 29.4% higher for Republicans than Democrats and also elevated relative to Independents. Table 3 shows that Republicans and Democrats differed significantly on twice as many items (six) as Republicans and Independents (three). There was a significant correlation between total score and likelihood of voting for Donald Trump in the next presidential election ($r(207) = 0.33$, $p < 0.0005$). However, the total score did not differ by gender or age (not shown). Only those with a graduate or professional education had a mean above 500

Table 2 Correlations among ten COVID-19 disease and vaccine statements (0 = strongly disagree to 100 = strongly agree) among unvaccinated Hispanics. Statements were "The developers of the COVID-19 vaccine rushed the development and cut corners" (1. rushed); "The COVID-19 vaccine does not work" (2. not work); "If I've already had COVID-19, I don't need the vaccine" (3. prior COVID); "The COVID-19 vaccine is just the virus and will infect you with the disease" (4. vac = virus); "The COVID-19 vaccine will make me infertile" (5. infertile); "The vaccine isn't necessary because COVID-19 has a low mortality rate" (6. low mortality); "The COVID-19 vaccine will change parts of my DNA" (7. change DNA); "I don't need the vaccine because everyone else around me has already received it" (8. everyone else); "I only need the vaccine if I want to travel out of the country" (9. travel only); "COVID-19 is a myth" (10. COVID = myth). All correlations were $p < .001$ except [n] non-significant

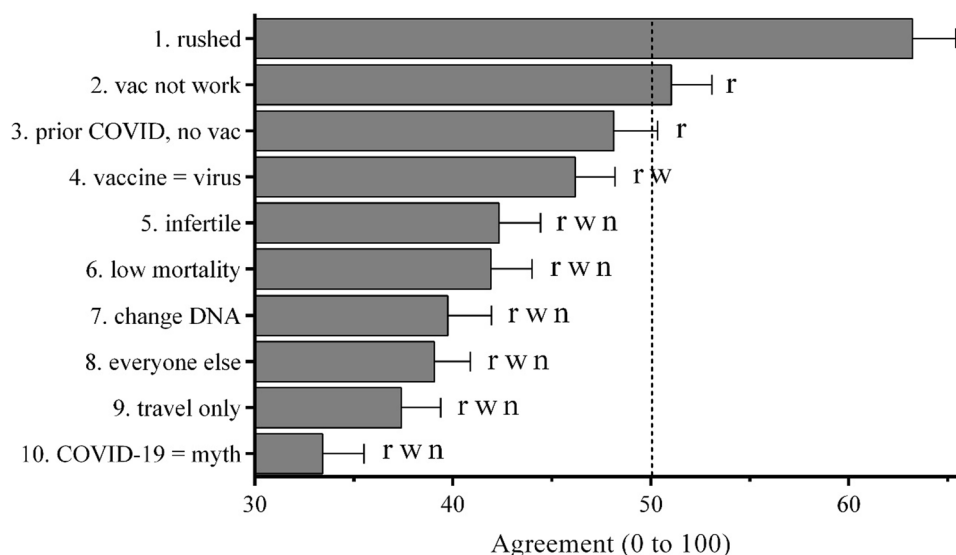|	1	2	3	4	5	6	7	8	9	10
1. rushed	1.00									
2. not work	0.56	1.00								
3. prior COVID	0.47	0.56	1.00							
4. vaccine = virus	0.45	0.42	0.31	1.00						
5. infertile	0.50	0.44	0.36	0.52	1.00					
6. low mortality	0.38	0.57	0.50	0.42	0.44	1.00				
7. change DNA	0.44	0.54	0.55	0.46	0.54	0.53	1.00			
8. everyone else	0.27	0.43	0.44	0.43	0.43	0.48	0.55	1.00		
9. travel only	0.01[n]	0.12[n]	0.25	0.23	0.15[n]	0.23	0.21[n]	0.49	1.00	
10. COVID = myth	0.23	0.50	0.37	0.47	0.36	0.55	0.53	0.45	0.28	1.00

Fig. 1 Rating (+ SEM) of ten controversial COVID-19 disease and vaccine statements (0 = strongly disagree to 100 = strongly agree) among unvaccinated Hispanics, ranked. Neutral (50) is shown with a vertical dashed line. Statements were "The developers of the COVID-19 vaccine rushed the development and cut corners" (1. rushed); "The COVID-19 vaccine does not work" (2. vac not work); "If I've already had COVID-19, I don't need the vaccine" (3. prior COVID, no vac); "The COVID-19 vaccine is just the virus and will infect you with the disease" (4. vaccine = virus); "The COVID-19 vaccine will make me infertile" (5. infertile); "The vaccine isn't necessary because COVID-19 has a low mortality rate" (6. low mortality); "The COVID-19 vaccine will change parts of my DNA" (7. change DNA); "I don't need the vaccine because everyone else around me has already received it" (8. everyone else); "I only need the vaccine if I want to travel out of the country" (9. travel only); "COVID-19 is a myth" (10. COVID-19 = myth). [r] $p < .001$ versus 1, rushed; [w] $p < .05$ versus 2, vaccine not work; [n] $p < .05$ versus 3, prior COVID, no vaccine

Table 3 Ratings of ten COVID-19 disease and vaccine statements (0 = strongly disagree to 100 = strongly agree) among unvaccinated Hispanics, by political party identification. Statements were "The developers of the COVID-19 vaccine rushed the development and cut corners" (1. rushed); "The COVID-19 vaccine does not work" (2. vaccine not work); "If I've already had COVID-19, I don't need the vaccine" (3. prior COVID); "The COVID-19 vaccine is just the virus and will infect you with the disease" (4. vac = virus); "The COVID-19 vaccine will make me infertile" (5. infertile); "The vaccine isn't necessary because COVID-19 has a low mortality rate" (6. low mortality); "The COVID-19 vaccine will change parts of my DNA" (7. change DNA); "I don't need the vaccine because everyone else around me has already received it" (8. everyone else); "I only need the vaccine if I want to travel out of the country" (9. travel only); and "COVID-19 is a myth" (10. COVID-19 = myth)

	Republicans (R)		Independents (I)		Democrats (D)		R vs I	R vs D
	Mean	SEM	Mean	SEM	Mean	SEM	p value	p value
1. Rushed	75.0	3.8	59.9	4.6	58.0	4.6	.013	.005
2. Vaccine not work	60.1	3.2	50.3	4.2	48.1	4.6	.084	.047
3. Prior COVID	59.9	4.2	52.4	4.6	38.5	4.3		.001
4. Vaccine = virus	55.7	4.3	42.6	4.0	46.4	3.8	.029	
5. Infertile	45.5	4.1	38.3	4.2	41.2	4.6		
6. Low mortality	52.2	4.2	42.3	4.2	35.6	4.3	.099	.007
7. Change DNA	52.8	4.2	36.8	4.6	35.9	4.5	.012	.007
8. Everyone else	41.9	3.2	38.6	3.5	33.0	3.9		.080
9. Travel only	38.2	4.0	33.3	3.9	38.9	4.4		
10. COVID-19 = myth	41.1	4.4	35.5	4.2	28.2	4.0		.033
Total 1 to 10	522.5	24.5	430.0	29.5	403.9	30.2	.018	.003

(i.e., on the "agree" end of the spectrum for all items) (Supplemental Fig. 2).

The total score was examined based on news source. Those whose primary source of news included CNN had a lower score relative to Fox, NBC, CNN en Español ($p < 0.05$), and local newspaper ($p < 0.01$) (Supplemental Fig. 3). Fox viewers were neutral (52.9, SD = 31.4), while CNN viewers slightly disagreed (37.7, SD = 28.4) regarding "If I already had COVID-19, I don't need the vaccine" ($t(144) = 2.95$, $p < 0.005$). Fox news (67.4, SD = 29.2) viewers scored higher than CNN (52.9, SD = 31.5) on the "vaccine was rushed" statement ($t(144) = 2.86$, $p < 0.005$).

Discussion

This novel report with a national US sample of unvaccinated Hispanics is generally congruent with and extends upon prior COVID-19 vaccine hesitancy research conducted earlier in the pandemic and with less targeted samples [8, 9, 11, 12, 16, 17]. Two complementary approaches were used to identify the rationale for not being vaccinated 8 months after the first vaccine had received an emergency use authorization. First, when participants were asked to select their top three reasons, concern about side effects and safety concerns regarding the vaccine contents were identified by over three-fifths of participants. Side effects were the primary concern even before a COVID vaccine was available [8]. A small subset, one out of eleven, endorsed religious beliefs. There was a negative association between an external health locus

of control and vaccination intentions [5] as well as misconceptions about fetal tissue being used in vaccine production [19], so this reported frequency was lower than anticipated. One out of twelve participants selected "cost" which is curious as the vaccine is freely provided, perhaps revealing an important misconception that could be targeted. Continued educational efforts on how to sign up for the vaccination or greater use of mobile clinics or increased vaccination availability by primary care providers may be practical strategies to target these small (< 6% each), but important, unvaccinated subgroups. The subset (9.1%) of participants reporting a medical exemption may also warrant further attention as the Centers for Disease Control recommended vaccination for everyone ≥ age 12 [20] with no absolute contraindications.

Our second strategy to identify individual differences in vaccination decisions was to ask participants to rate their agreement with ten contentious COVID-19 statements. Interestingly, even among this unvaccinated sample, participants, on average, disagreed that the COVID-19 will make them infertile, will change their DNA, or that the disease is a myth. The statement that was most strongly endorsed was that "The developers of the COVID-19 vaccine rushed the development and cut corners." These quantitative findings are congruent with a large (N = 754) qualitative report from Arkansas [16]. The second highest rated statement was "The COVID-19 vaccine does not work." The continued emergence of new variants makes the earlier randomized controlled trials [21, 22] less helpful for efficacy information, but these well-powered datasets are still valuable to inform short-term safety. Some hospitals make publicly available the pronounced over-representation of the

unvaccinated among those that were hospitalized [23, 24] which may also combat this misperception.

It is difficult to understate the degree that political ideology has come to overlap with COVID-19 beliefs [8, 9]. Republicans more strongly endorsed three of the ten COVID-19 statements including that COVID-19 will change my DNA and that "The COVID-19 vaccine is just the virus and will infect you with the disease" relative to those who identified as Independents. Republicans and Democrats differed on six items and on the total score for all ten statements. While the strength of attitudes differed by political party, it is important to recognize that all three political affiliations (Republican, Democrat, and Independents) were equally represented among the unvaccinated. Similarly, as reported previously [8, 25], whether these participants obtained their news from more liberal (e.g., CNN) or more conservative (e.g., Fox) sources differentiated COVID-19 attitudes. Importantly, there is some evidence that vaccination disparities by race/ethnicity have narrowed, while disparities by political affiliation have widened [26]. Although it is unfortunate that this pressing medical and public health issue is subsumed within the US culture wars for many, these findings and others [9, 11] indicate that unique messages may continue to be differentially targeted to these subgroups.

Vaccination decisions are due to a variety of sociological and psychological factors including race/ethnicity, political beliefs, rural/urban residence, economic considerations, and the intersection of these characteristics [11, 27]. Hispanics unvaccinated for COVID-19 are non-homogenous and exist on a continuum that includes those that are hesitant (e.g., "wait and see") or facing logistical barriers (e.g., time off work, transportation) to those that whose views are entrenched and may require substantial education, or employment requirements, to change their behavior. There are broad tools like mandates to get vaccinated as a requirement for employment, education, or travel and more subtle nudges employed by behavioral economists [28–30]. While recognizing that the relationship between attitudes and behaviors is complex [31], utilization of positive, targeted [32], and culturally responsive messaging on COVID-19 vaccines and using vaccinated Hispanic health-care workers as vaccine ambassadors targeting the themes identified here should be evaluated in controlled research.

Some caveats and future directions are noteworthy. First, this investigation relied on self-reported data from a national sample of one thousand with two hundred which met the unvaccinated inclusion criteria, recruited online. Future investigations should also target Hispanics whose primary language is not English and compare Hispanics versus other minorities and the general population. Second, we were initially surprised that religious factors did not rank more prominently as a reason for not being vaccinated. The low attendance at virtual or in-person religious events may reflect either the magnitude of COVID-19-induced disruption of these events or that the sample was atypical on this variable. Third, although the total score for the ratings of the controversial statements showed good internal consistency and clear differences by political affiliation, future psychometric studies should evaluate test–retest reliability and provide additional validation information (e.g., comparing COVID-19 attitudes and misconceptions among the vaccinated and unvaccinated). Fourth, as is true for any point in time survey, these data reflect the interval (Summer, 2021) of data collection which was before the vaccines received full Food and Drug Administration approval. Much clinical, epidemiological, and basic science COVID-19 information is rapidly changing [15, 20–22] which will inform survey items on future attitudinal studies.

In conclusion, the stakes are high for understanding, and overcoming, the multifaceted nuances of vaccine hesitancy among Hispanics and others [4]. We are cautiously optimistic that this report, and future quantitative and qualitative ones, can empirically inform strategies to most efficiently target a decreasing subset of the US population that is unvaccinated against COVID-19.

Declarations

Ethics Approval The Geisinger IRB approved this study as exempt.

Conflict of Interest BJP is part of an osteoarthritis team supported by Pfizer and Eli Lilly. The other authors have no disclosures.

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