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Beliefs about COVID-19 testing and treatment: A national survey of Black and White adults

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ABSTRACT

Objectives: Knowledge, access, and use of testing and antiviral treatments is critical to managing and mitigating the continuing burden of the novel Corona Virus (COVID-19) in the United States. This study measured knowledge, attitude, behaviors, and self-reported barriers towards COVID-19 testing and outpatient anti-viral medications (OPA) treatments among Black and older individuals who face greater hospitalization and mortality from the disease.

Study design: Cross-sectional structured survey.

Methods: Respondents were randomly selected from an opt-in national panel in December 2022. Equal numbers of Black and White US adults over the age of 40 (n = 1037) completed the 42 item online survey. The main measures were key sociodemographic variables of respondents, race, age, political affiliation and COVID-19 attitudes, beliefs, testing behaviors, and knowledge and barriers to OPA access.

Results: Overall, awareness and knowledge of COVID-19 outpatient treatments was low. Black respondents were more likely to test for COVID-19 than White respondents but less likely to know about OPA treatments. Insurance coverage was a significant factor in use of home tests. Knowledge of OPA treatments was low across groups. White respondents were more likely than Black respondents to be aware of OPA treatments (1.75, 95 % CI [1.31–2.33]) as were higher income respondents (1.13, 95 % CI [1.08–1.17]) and self-identified Liberals (1.79, 95 % CI [1.29–2.49]).

Conclusions: Clinicians should know large numbers of patients may not be testing for COVID-19, nor are they aware of outpatient treatment options and may hold inaccurate beliefs about them. Developing culturally specific patient education materials are warranted to increase testing, utilization of vaccinations and OPAs.

1. Introduction

Even though the novel Corona Virus (COVID-19) pandemic is over [1], excess morbidity and death from COVID-19 continues, making it the third leading cause of death in the US [2]. This burden is not equitably distributed in the US and disparities in COVID-19 infection and outcomes vary between older and younger people [3], individuals within different workplaces and occupations [4,5], and between people from different racial and ethnic groups [6,7]. Blacks are over twice as likely as Whites to be hospitalized due to COVID-19 [8] and older individuals are at greatest risk for hospitalization and death. When adjusted for age differences [9], Blacks have a 1.6 times higher mortality rate than Whites

[8]. It is likely that large swaths of the population will never be vaccinated [10–14]. As COVID-19 testing and vaccination requirements are de-emphasized [15], knowledge of and access to COVID-19 treatment, especially the newer outpatient anti-viral medications (OPA) become important to reduce mortality and morbidity. Nonetheless, utilization of OPAs is low [16] although factors inhibiting adoption are unclear.

Currently, there are two OPA drugs available to the public (Paxlovid and Lagevrio/Molnupiravir) [17] with more in development [18]. Both drugs are antiviral therapies but work differently. Paxlovid includes an antiviral booster and inhibits a key COVID enzyme [19]. Molnupiravir works by incorporating itself into viral RNA synthesis resulting in mutations that inhibit the COVID virus from functioning [20]. Both are

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taken orally in an outpatient setting within 5 days of onset of symptoms and can reduce rates of hospitalization and death by up to 89 % [21,22].

COVID-19 testing hesitancy or lack of access is a significant barrier to treatment. Although a "Test-to-Treat" COVID-19 protocol was introduced in Pharmacies in March 2022 [23,24] to facilitate rapid testing and treatment, access to OPAs continues to be limited [25]. Pharmacies have charged patients up to $100 for appointments to obtain a prescription [26] and the program has shown geographical inaccessibility for large portions of the population [27]. Further, patients' beliefs about the seriousness of COVID-19, fear of loss of income or social stigma may influence whether or not they test [28–34]. However, the studies examining predictors of COVID-19 testing have had small sample sizes [30,35], or were conducted early in the pandemic, before the availability of OPAs [31–33,36–38].

Another potential barrier to the administration of OPAs include misinformation about COVID-19 treatments [39–42]. Patients may have apprehensions about symptom "rebound" [43,44], a concern shared by some physicians [45]. Only a single study has surveyed the American public's reasons for taking or not OPA treatment [16]. Its results suggest reluctance to take early treatment when initial symptoms are perceived as mild or when no recommendation from their healthcare provider is forthcoming [16].

The aim of this study was to explore the attitudes, behaviors, and self-reported barriers towards COVID-19 testing and early treatment such as OPAs among older (over 40 years old) Black and White adults in the US. The significance of this study is that it would provide new knowledge about the barriers to COVID-19 testing and OPA treatment and inform development of culturally-specific COVID-19 education to increase testing and OPA treatment.

2. Methods

This anonymized survey study was deemed exempt by the Temple University Institutional Review Board after review, consistent with the updated Common Rule guidelines [46].

2.1. Survey design and measurement

The survey was designed to collect information about attitudes and past and projected future behaviors concerning COVID-19 testing and treatment. Best practices in survey design were adhered to by employing an approach that considered the language needs of nonwhite and lower literacy populations, as highlighted by Barreto et al. (2018) [47].

The survey was comprised of 42 items designed for ease of self-administration and comprehension by a heterogeneous group of respondents. Survey questions used standardized scales or previously piloted questions. Respondents were asked to complete 11 sociodemographic questions (See Table 1). Testing behaviors were assessed using 5 closed-ended questions including the number and type of tests taken and how they paid for them. Two 5-point Likert items measured COVID-19 testing self-efficacy. Reasons why respondents chose to test for COVID-19 and perceived barriers and access to COVID-19 testing were collected using single multi-select questions based on prior research and piloting [48–50]. Infection history, hospitalization, and long COVID-19 experience were assessed with yes/no questions. Early treatment knowledge was assessed with 5 true/false questions comprising a composite scale. Basic awareness of OPA treatments was assessed with 1 yes/no question and 6 true/false questions, which formed a summary scale of OPA knowledge with higher scores indicating more knowledge. Perceived access to OPA treatments was assessed with a yes/no question and source of prescription was measured with a 6 choice multi-select question. Attitudes towards the utility of testing and the perceived severity of COVID-19 were measured with two 5-point Likert items. (See survey included in appendix).

Table 1
Sample demographic and outcome variables (n = 1037).

	All	Self-Tested		Aware of OPAs	
	N=1037	Yes (N=768)	No (N=269)	Yes (N=394)	No (N=643)
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Race					
Black	516 (49.8)	400 (52.1)	116 (43.1)	162 (41.1)	354 (55.1)
White	521 (50.2)	368 (47.9)	153 (56.9)	232 (58.9)	289 (44.9)
Hispanic					
Yes	27 (2.6)	21 (2.7)	6 (2.2)	13 (3.3)	14 (2.2)
Sex					
Female	521 (50.2)	391 (50.9)	130 (48.3)	200 (50.8)	321 (49.9)
Age (Years), M (SD)	58.4 (11.5)	58.2 (11.5)	58.9 (11.6)	59.4 (11.3)	57.8 (11.6)
Annual Income					
Less than $30,000	318 (30.7)	224 (29.2)	94 (34.9)	96 (24.4)	222 (34.5)
$30,000 - $59,999	316 (30.5)	239 (31.1)	77 (28.6)	103 (26.1)	213 (33.1)
More than $60,000	366 (35.3)	284 (37)	82 (30.5)	184 (46.7)	182 (28.3)
NR	37 (3.6)	21 (2.7)	16 (5.9)	11 (2.8)	26 (4)
Education					
High School or Less	274 (26.4)	188 (24.5)	86 (32)	69 (17.5)	205 (31.9)
Some College/ Trade	427 (41.2)	318 (41.4)	109 (40.5)	142 (36)	285 (44.3)
4-year Degree or More	336 (32.4)	262 (34.1)	74 (27.5)	183 (46.4)	153 (23.8)
Insurance					
Yes	932 (89.9)	713 (92.8)	219 (81.4)	364 (92.4)	568 (88.3)
Insurance Type					
Public	585 (56.4)	437 (56.9)	148 (55)	227 (57.6)	358 (55.7)
Private	403 (38.9)	322 (41.9)	81 (30.1)	169 (42.9)	234 (36.4)
Political Affiliation					
Conservative	327 (31.5)	228 (29.7)	99 (36.8)	108 (27.4)	219 (34.1)
Moderate	457 (44.1)	350 (45.6)	107 (39.8)	161 (40.9)	296 (46)
Liberal	252 (24.3)	189 (24.6)	63 (23.4)	125 (31.7)	127 (19.8)
Self-Tested (y/n)					
Yes	768 (74.1)	768 (100)	0 (0)	314 (79.7)	454 (70.6)
No	269 (25.9)	0 (0)	269 (100)	80 (20.3)	189 (29.4)
Aware of OPAs (y/n)					
Yes	394 (38)	314 (40.9)	80 (29.7)	394 (100)	0 (0)
No	643 (62)	454 (59.1)	189 (70.3)	0 (0)	643 (100)

2.2. Study population and data collection

Data was collected in December 2022 via a nationally distributed, online survey hosted by Qualtrics Inc. utilizing a representative research panel to target nonhealth professional adults over the age of 40who self-identified as either Black/African American or White/Caucasian. Respondents also self-identified sex (male/female/nonbinary). Quota sampling ensured a balanced distribution of race and male/female. Respondents reporting another sex were not included in the analysis (n = 4). The approach yielded 1037 respondents with an average survey completion time of 7.0 min. Surveys completed under 2 min and surveys that were not submitted as directed were excluded. Respondents received compensation from Qualtrics for completion.

2.3. Data analysis

Bivariate analyses between the independent and dependent variables were performed using chi-square for nominal data and *t*-test for continuous data. Results were deemed significant at α = 0.05. Two multiple logistic regression models were used to evaluate the relationship between demographic characteristics and the primary outcomes: (1) COVID-19 testing behaviors and (2) awareness of OPA treatment options (Paxlovid and Lagevrio/Molnupiravir). Model variables included age, race, sex, annual income, political self-characterization, and insurance status. Although interaction terms were incorporated to assess relationships among the independent variables, in both instances the simpler models outperformed across several measures (AIC, AUC, and the Hosmer-Lemeshow test) while maintaining interpretability. All data analyses were performed using SAS 9.4.

3. Results

3.1. Sample demographics

The sample was comprised of 49.8 % (n = 516) of Black and 50.2 % (n = 521) White respondents. Of the Black and White respondents, 2.6 % (n = 27) of the sample also identified as Hispanic ethnicity. Females represented 50.2 % (n = 521) of the sample. A majority of the sample (n = 763, 73.6 %) reported some college or technical education with the remaining (n = 274, 26.4 %) reporting a high school diploma equivalent or less (see Table 1).

Black and White respondents differed significantly on several sample characteristics. Blacks were significantly younger than Whites (55.5 years (SD 10.7) vs. 61.2 years (SD 11.7), *P* < 0.001) and Whites were more likely to report a bachelor or higher degree (n = 195, 37.4 %) as compared to Blacks (n = 141, 27.3 %; *P* = 0.004). Blacks leaned towards 'liberal' or 'moderate' political beliefs more than Whites (n = 153 (29.7 %) vs. n = 99 (19.0 %); n = 258 (50 %) vs. n = 199 (38.2 %)), while Whites were notably more inclined to identify as 'conservative' (n = 223 (42.8 %) vs. n = 104 (20.2 %)); all differences were statistically significant (*P* < 0.001).

3.2. COVID-19 experience

One-third of the sample reported having had COVID-19 (n = 325, 31.3 %), with no statistically significant differences between Whites and Blacks. Of these, 5.5 % (n = 18) were hospitalized, and 30.5 % (n = 99) reported long term health problems of at least 1–3 months or longer duration. Blacks were more likely to have tested for COVID-19 than Whites (n = 400 (77.5 %) vs n = 368 (70.6 %); *P* < 0.01). Overall, 74.1 % (n = 768) of the sample had taken a COVID-19 test, had not paid out-of-pocket and 92 % (n = 954) felt confident that they could obtain a COVID-19 test if needed.

3.3. COVID-19 severity beliefs

Over 20 % (n = 210) of respondents rated COVID-19 infection as "Not serious" with men more likely than women to hold this belief (n = 120 (23.4 %) vs n = 90 (17.3 %); *P* < 0.001). Likewise, politically conservative respondents regarded the disease as less serious (n = 109, 33.3 %) compared to moderate (n = 80, 17.5 %) or liberal respondents (n = 22, 8.7 %; *P* < 0.001) (Table 2). Blacks were more likely to characterize COVID-19 as a serious/extremely serious disease (n = 458 (88.8 %) vs. n = 368 (70.7 %); *P* < 0.001), and rate COVID-19 testing as very or moderately useful (n = 467 (90.5 %) vs. n = 419 (80.5 %); *P* < 0.001) compared to Whites.

3.4. COVID-19 testing behaviors

A substantial majority (74.1 %, n = 768) of respondents reported

Table 2
Perceived severity of COVID-19.

	How serious a disease do you believe COVID-19 is?			
	Extremely Serious	**Serious**	**Not Serious**	***P* Value**
	No. (%)	No. (%)	No. (%)	
Sex				
Female (n = 521)	353 (67.8)	78 (15)	90 (17.3)	***P* < 0.001**
Male (n = 512)	286 (55.9)	106 (20.7)	120 (23.4)	
Race				
Black/African American (n = 516)	390 (75.6)	68 (13.2)	58 (11.2)	***P* < 0.001**
White/Caucasian (n = 521)	251 (48.2)	117 (22.5)	153 (29.4)	
Education				
High School or Less	170 (62)	42 (15.3)	62 (22.6)	*P* = 0.12
Some College/Trade	265 (62.1)	70 (16.4)	92 (21.6)	
4-year Degree or More	206 (61.3)	73 (21.7)	57 (17)	
Political Affiliation				
Conservative (n = 327)	154 (47.1)	64 (19.6)	109 (33.3)	***P* < 0.001**
Moderate (n = 457)	290 (63.5)	87 (19)	80 (17.5)	
Liberal (n = 252)	196 (77.8)	34 (13.5)	22 (8.7)	

Note: Boldface indicates statistical significance (*p* < .05).

having used a COVID19 home test while 25.9 % (n = 269) had not. A bare majority of respondents indicated that they were highly confident in their ability to use (n = 527, 50.8 %) and interpret (n = 531, 51.3 %) a COVID-19 home test with 15 % (n = 155) expressing no confidence and 13.1 % (n = 136) doubting their ability to interpret the results. Conservative respondents were more likely to express a lack of confidence in home testing (n = 66, 20.2 %) as compared to moderates (n = 64, 14 %) or liberals (n = 25, 9.9 %; *P* < 0.001). Conservatives also expressed greater doubt concerning test interpretation than liberals (n = 60 (18.4 %) vs. n = 19 (7.5 %); *P* < 0.001). No racial differences were found (*P* = .84), although Blacks (n = 373, 72.3 %) reported a greater belief that home testing was useful compared to Whites (n = 289, 55.5 %; *P* < 0.001).

Modeling use of COVID-19 home tests (y/n) found significant associations between the likelihood of testing and respondent race, income, and insurance status (Table 4). White participants were 29 % less likely to have tested themselves for COVID-19 (0.71, 95 % CI [0.52–0.97]) and although annual income showed a small effect (1.05, 95 % CI [1.004–1.11]) on the decision to self-test, the participant's insurance status showed a substantial impact. Insured individuals were 2.95 times more likely to test (2.95, 95 % CI [1.88–4.63]) than those without insurance, highlighting the importance of health coverage. The model was significant (*P* < 0.001) and results of the Hosmer-Lemeshow test indicated an adequate fit (*P* = 0.51).

3.5. Modeling results: OPA treatment, knowledge and beliefs

General awareness of OPAs was low, with only 38 % (n = 394) of respondents indicating awareness of OPAs; a majority (n = 643, 62 %) had not heard of them. Specific knowledge of treatment options was also low with almost a quarter (n = 254, 24.6 %) of the sample reporting that Hydroxychloroquine and Ivermectin were safe and effective and 47.7 % (n = 493) stating uncertainty. While 79.5 % (n = 824) agreed that early medical treatments can be valuable, most people (n = 636, 61.4 %) reported that they did not know whether the treatments were for individuals who were in-hospital or were to be taken by patients at home and did not know when in the course of the illness they should be taken (n = 524, 50.6 %). Finally, although almost half the sample (n = 507, 48.9 %) did not know whether they could access these treatments, a majority reported their primary care physician as a source (n = 756,

72.9 %) (Table 3).

Whites were more likely than Blacks to have heard of OPA treatments (n = 232 (44.5 %) vs. n = 162 (31.4 %); *P* < 0.001) and to correctly identify that these treatments could reduce the risk of hospitalization (n = 311 (59.8 %) vs. n = 254 (49.2 %); *P* < 0.001). Age also appears to be a factor: whereas 65.9 % (n = 108) of respondents between the ages of 70 and 79 understood OPAs to reduce the risk of hospitalization from COVID-19, only 47.7 % (n = 142) of respondents in their forties were aware (*P* = 0.004). This younger age group (41–49 years old) was also less aware of the 5-day period following a positive COVID test in which OPAs should be administered; 60.4 % (n = 180) believed this to be false or did not know the answer. Participants ages 70–79 were incorrect or unsure of the critical treatment period less than half the time (42.7 %, n = 70; *P* = 0.009)

Modeling awareness of OPAs (y/n) found significant associations between race, income, and political affiliation (Table 4). White respondents were 1.75 times more likely than Black respondents to be aware of OPA treatments (1.75, 95 % CI [1.31–2.33]). Each $10k increase in household income correlated with a 12.5 % awareness boost (1.13, 95 % CI [1.08–1.17]). Self-identified Liberals were 1.79 times more likely to know of OPA treatments (1.79, 95 % CI [1.29–2.49]). The model was significant (*P* < 0.001), and the Hosmer-Lemeshow test confirmed suitable fit (*P* = 0.23).

4. Discussion

The economic, socioemotional and clinical burden of COVID-19 is lower than at the height of the pandemic but remains outsized [51]. For patients, the burden of severe illness and death is unequally distributed, weighing more heavily on Black and older Americans. The rollout of new tools like OPAs have the capacity to reduce this burden, but require patients to know they have COVID-19 through prompt testing, be aware of OPAs, and have access to these treatments, including willingness of PCPs to prescribe. This study identified key groups of people who are less likely to test for COVID-19 and know about OPA treatments. Understanding who is at risk provides important knowledge to clinical providers, community health workers and policymakers as they work to mitigate the continuing impact of COVID-19.

The first step in taking an OPA is timely testing for COVID-19. Blacks

Table 3
Knowledge about COVID-19 treatment and antivirals (n = 1037).

Percentage of Correct Responses (True/False)	No. (%)
Early Treatment Knowledge Items (M = 2.7, SD = 1.4)	
Currently, there is no effective cure for COVID-19. (T)	586 (56.1)
Hydroxychloroquine or Ivermectin are safe and can treat COVID-19. (F)	287 (27.7)
Some natural alternatives such as honey, ginger or eucalyptus can be used to treat the disease/fight the virus. (F)	413 (39.8)
There are now anti-viral medications that can help patients recover from the infection. (T)	661 (63.7)
Early medical treatment for symptoms can help most patients recover from the infection. (T)	824 (79.5)
OPA Knowledge Items (M=2.3, SD=2.0)	
These treatments are for patients who are hospitalized with COVID-19. (F)	177 (17.1)
You can take these treatments even if you have not taken a COVID-19 test but have been exposed to someone with COVID-19. (F)	204 (19.7)
The treatment should be taken within 5 days of taking a test that shows you have COVID-19. (T)	476 (45.9)
These treatments will definitely cure COVID-19. (F)	409 (39.4)
These treatments will help you get better faster and reduce your risk of hospitalization. (T)	565 (54.5)
These treatments are useless. (F)	509 (49.1)

Table 4
Results from logistic regression analysis: Indicators of COVID-19 testing and awareness of OPAs.

	Used COVID-19 Home Test (y/n)		Awareness of OPAs (y/n)	
	Odds Ratio	95 % CI	Odds Ratio	95 % CI
Age (Years)	0.99	0.98–1.01	1.01	0.99–1.02
Race (White v. Black)	0.71	0.52–0.97	1.75	1.31–2.33
Sex (Female v. Male)	1.10	0.82–1.48	1.11	0.85–1.46
Political Beliefs				
Conservative (y/n)	0.72	0.51–1.02	0.74	0.53–1.03
Liberal (y/n)	0.88	0.61–1.29	1.79	1.29–2.49
Annual Income[a]	1.05	1.00–1.11	1.13	1.08–1.17
Insurance v. Uninsured	2.95	1.88–4.63	1.15	0.71–1.88

Note.
[a] $10k increments.

were more likely than Whites (77.5 % vs. 70.6 %) to have tested for COVID and more likely to believe COVID-19 testing useful (72.3 % vs. 55.5 %). This may be because they were also more likely to assert that COVID-19 was an "extremely serious" disease compared to Whites (75.6 % vs. 48.2 %). This study was not designed to identify which messages and messengers are the most persuasive in specific populations.

Nonetheless, we found that this sample had significant gaps in their awareness and knowledge of OPAs that could keep them from seeking treatment. Only a minority (38 %) had heard of OPAs (31.4 % of Blacks and 44.5 % of Whites). The logistic regression analysis demonstrated that even with controlling for covariates Whites were 1.5 times more likely to have heard of OPA treatments than Blacks. Indeed, being Liberal, having higher income, and identifying as White were the shared characteristics of those most likely to be aware of OPA treatments.

Of concern is the finding that notable minorities of our samples held incorrect beliefs about outpatient COVID-19 treatment options, including 24.5 % who believed that Hydroxychloroquine or Ivermectin are safe and could treat COVID-19, and 21.5 % who thought OPAs were only available to hospitalized patients. While Blacks had significantly worse understanding than Whites in our sample on some key items, neither group showed high levels of knowledge. 57.7 % of Blacks and 50.3 % of Whites didn't know patients must begin treatment within the first five days of the disease. Half of Blacks (50.8 %) did not know OPAs can help speed recovery and reduce risk of hospitalization while 40.1 % of Whites were also unaware. Consistent with prior studies [52], this study's data indicate that younger respondents and politically conservative respondents were less likely to test for COVID-19 and have accurate information about OPAs.

These gaps point to a significant need for public education about OPAs. Social media campaigns may also be warranted. These results also suggest once diagnosed, patients need clear and concise messaging from the healthcare team that will counter misinformation and provide options for up-to-date treatment and care. A 2023 US survey reported low utilization of OPA treatments with only 20.5 % of patients aged 50–64 and 33.9 % those 65 and over taking an OPA when infected despite CDC guidance. In that same study, a common reason Black patients >65 did not take OPAs was because their healthcare provider didn't offer or recommend the treatment [16]. OPA treatments will continue to be underused if patients do not have an awareness of the treatment, a basic understanding of their benefits, and if physicians continue to be reluctant to prescribe them.

4.1. Limitations

This survey study has some limitations. It was conducted online, and although Qualtrics panels works to mitigate the inherent biases of online surveys, it should be noted that individuals with lower income and education and rural residence have lower participation rates. This study captured knowledge and attitudes about OPAs and COVID-19 testing at

one point of time after OPAs became widely available. The landscape of COVID-19 information and misinformation in this country is constantly evolving and we recognize that the results may not be as robust over time. Another limitation of the study is that it was not sufficiently powered to review interactions between sociodemographic variables on the study outcomes. Future studies should consider and more fully explore the relationships between race, age and political affiliation. Finally, the generalizability of this study is limited since it surveyed a specific a cross-section of American adults and excluded individuals <40 and those who did not identify as either Black or White.

5. Conclusion

The COVID-19 pandemic demonstrated that worldwide pandemic preparedness is low, and the United States has significant work to do in order to be prepared for the next pandemic. Our results point to incomplete awareness and knowledge of critical OPA treatments in some of the most vulnerable populations and demonstrates how the health care system should continue to focus on educating patients about OPA treatments. The official end of the pandemic, inclusive of ending availability of free testing and limited insurance coverage of home tests and affordable access to OPAs, may make it more difficult to monitor and control COVID-19 in the future.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.puhip.2024.100519.

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