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COVID-19

Exploring Perspectives on Establishing COVID-19 Vaccine Confidence in Black Communities

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Objective: To explore factors influencing COVID-19 vaccine decision-making among Black adults at high-risk for COVID-19 infection. Despite effective treatment and vaccination availability, Black Americans continue to be disproportionately impacted by COVID-19.

Design, Setting, and Participants: Using community-engaged qualitative methods, we conducted virtual, semi-structured focus groups with Black residents in Los Angeles County before widespread vaccine rollout. Recruitment occurred through local community partners.

Methods: As part of a larger study exploring COVID-19 vaccine decision-making factors among multiethnic groups, two-hour virtual focus groups were conducted between December 15, 2020 and January 27, 2021. Transcripts were analyzed using reflexive thematic analysis.

Main Outcome Measures: Themes and subthemes on factors for vaccine confidence and accessibility.

Results: Three focus groups were conducted with 17 Black participants, who were primarily female (n=15), residents of high-poverty zip codes (n=11) and employed full-time (n=6). Black-specific considerations for vaccine confidence and accessibility include: 1) reduced confidence in COVID-19 vaccines due to historical government inaction and racism (existing health inequities and disparities are rooted in racism; historical unethical research practices); 2) misunderstanding of Black communities' vaccine concerns ("vaccine hesitancy" as an inaccurate label to describe vaccine skepticism; ignorance to root causes of vaccine skepticism); and 3) recognizing and building on resources (community agency to address COVID-19 vaccine needs adequately).

Conclusions: Vaccination campaigns should improve understanding of underlying vaccination concerns to improve vaccine outreach effectiveness and should partner with, provide resources to, and invest in local, trusted Black community entities to improve COVID-19 vaccination disparities. *Ethn Dis*. 2022;32(4):341-350; doi:10.18865/ed.32.4.341

Keywords: Vaccine Confidence; Community-Engaged Research; Racial/Ethnic Disparities; Health Equity; Black/African Americans; Vaccine Hesitancy

Introduction

Across the United States, coronavirus disease 2019 (COVID-19) infections, hospitalizations, and deaths have disproportionately impacted Black communities.[1] Despite effective vaccines and treatments, COVID-19-related hospitalizations and death rates in some regions continue to be higher for Black individuals than non-Latino Whites and Latino individuals.[2] In Los Angeles County, Black residents, who represent 9% of the county's population, have the second-highest reported number of COVID-19 cases after Latinos, who represent nearly 49% of the county's population. As of May 2022, Black residents had the highest rates of COVID-related hospitalizations and deaths and had the lowest rates of COVID-19 vaccination.[3,4] Although the gap in COVID-19 vaccine disparities (eg, differences in vaccination rates between communities) has narrowed since the onset of vaccine rollout,[5] vaccine inequities (eg, differential vaccine access due to structural barriers) continue to be an important contributor to the sustained disproportionate impact of COVID-19 in Black communities.[6,7] Understanding vaccine decision-making is critical for narrowing vaccination disparities.

The imminent health threat posed by the COVID-19 pandemic was heightened by a time of social unrest

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and compounded by distrust rooted in historical systemic racism affecting Black communities.[8] In May 2020, the murder of George Floyd sparked outrage, national protests, and public discourse[9] about the legacies of police brutality and racial injustice.[8,10] At the same time, increasing awareness of vaccine misinformation and COVID-19 disparities in Black communities[11] influenced differential trust in emerging COVID-19 vaccines and therapeutics.[8] COVID-19 disparities resulted in calls for justice in testing, tracking, and monitoring COVID-19 outcomes by race/ethnicity in local communities and health systems.[12] As a result, pandemic efforts focused on promoting equitable distribution of COVID-19 resources, such as increasing accessibility and affordability of COVID-19 testing and treatment for low-income, underinsured, and uninsured populations, and creating trusted, culturally appropriate outreach about COVID-19 prevention and emerging vaccines.[12]

Vaccine inequities (eg, differential vaccine access due to structural barriers) continue to be an important contributor to the sustained disproportionate impact of COVID-19 in Black communities.[6,7]

However, mixed messaging and misinformation in the media, notably on social media, about COVID-19 and emerging vaccines, such as beliefs that the vaccines were being used to target Black communities for experimentation,[13,14] created substantial challenges in establishing trust in COVID-19 vaccination. These beliefs stem from a legacy of medical experimentation and abuses in Black communities, such as the Tuskegee Syphilis experiment, unethical use of cancer cells from the late Henrietta Lacks (eg, HeLa cells), state-led sterilization programs, and human radiation experiments.[15] The confluence of misleading pandemic narratives and heightened awareness of structural racism presented additional complexities in promoting confidence and trust in COVID-19 vaccines.[6,16,17]

Trust in public health institutions is crucial for equal vaccination access and uptake. This study sought to understand the multidimensional factors influencing vaccine confidence and decision-making for COVID-19 vaccination in Black adults in Los Angeles County before widespread vaccine rollout.

Methods

As part of a larger community-engaged qualitative study exploring COVID-19 vaccine decision-making among multiethnic/multiracial groups,[17] we conducted three 2-hour virtual focus groups with African American/Black (herein referred to as Black) residents in Los Angeles County between December 15, 2020 and January 27, 2021. Focus groups were conducted using the Zoom platform. The UCLA Institutional Review Board approved the study, and informed consent was obtained from all participants. We report our findings using the Standards for Reporting Qualitative Research.[18]

Participants were recruited via telephone, video conferencing, and email outreach to local community organizations working with Black communities in Los Angeles County or by describing the study during public, virtual town halls about COVID-19. Participant selection focused on Black participants facing a high risk of COVID-19 morbidity and mortality due to age, essential worker status, and high-poverty zip codes (median household income <$40,000, 2010 U.S. Census).[19-21] Focus groups were stratified by age (>50 years, <50 years, and mixed-age).

Our semi-structured focus group discussion guide was based on previous vaccine hesitancy literature and incorporated feedback from community organizations.[22-25] Questions focused on concerns, risks, benefits, information sources, trusted entities, barriers, and recommendations for improving access (Table 1). Participants were asked to contribute their individual perspectives and the perspectives of their families and communities. Two Black researchers (LNM, EN) with experience in qualitative research facilitated the three focus groups to enhance congruency with participants. Each group began by restating the study's purpose and emphasizing the importance of com-

Table 1. Focus group guide questions

1	Icebreaker: Please state your name, tribal affiliation (if applicable), current feelings on the pandemic, and one word to describe your racial/ethnic community.
2	What have you or members from your community heard about any vaccines to protect against COVID-19?
3	What concerns do you, your family, or your community have about receiving the COVID-19 vaccine? What additional information do you need to feel comfortable to receive the COVID-19 vaccine?
4	When a COVID-19 vaccine is available, from whom and where would you feel most comfortable getting the vaccine?
5	What do you think are some risks and benefits of the COVID-19 vaccine?
6	Situational questions: It could be the case that some of the vaccines offered may not protect 100% against COVID-19 infection. The vaccine may lower the chances of being infected by COVID-19. Or, if you do get COVID, the vaccine may lower your chances of getting very sick from it (reduce the severity of the disease or reduce additional health complications). However, it may not be perfect, and it may not prevent 100% of people from COVID-19. How would you feel about the information (that getting the vaccine does not 100% protect against being infected)?
7	What challenges do you, your family, or people you know face in getting the COVID-19 vaccine?
8	What are some ways to get the COVID-19 vaccine to the people who need it most when it becomes available?

munity voices for understanding COVID-19 vaccine acceptability to shape public health policies. We facilitated an icebreaker where moderators and participants described their community and feelings on the pandemic. Other research team members, who were also involved in scheduling and conducting the demographic survey, attended each session to ensure consistent use of the guide and prompts, facilitate debriefing, and record field notes. All sessions were audio-recorded and professionally transcribed. Participants also completed an online survey on attitudes toward COVID-19 vaccination and demographics and received a $100 gift card.

As described in the larger study,[17] transcripts were analyzed using Atlas.ti qualitative software using reflexive thematic analysis.[26] Two researchers with qualitative methods expertise (SLC, LNM) reviewed the transcripts and field notes to develop a preliminary codebook, then tested and amended the codebook's initial practicality following the coding of two transcripts. The coders reached an iterative consensus on the codebook, including code definitions and coding approach, and used memos to document thematic evolution throughout the analysis. Themes were reviewed to identify patterns, consistencies, and inconsistencies in vaccine acceptability, accessibility, and information across each racial/ethnic focus group. Triangulation was achieved by reviewing the field notes, holding iterative discussions with all moderators/facilitators, and sharing preliminary results at community-partnered meetings to validate perspectives. Results herein focus on salient Black-specific considerations for vaccine confidence and accessibility not previously described in the larger multiethnic study article.[17]

Results

Of 28 eligible Black adults, 17 individuals participated in three focus groups. Each focus group included 5-6 participants. Most participants were female (88%), resided in low-income zip codes (65%), were employed full-time (59%), and reported either baccalaureate (35%) or graduate level (47%) education. Only a subset (24%) reported they were likely or very likely to receive the COVID-19 vaccine when it became available. Demographic characteristics are shown in Table 2, and surveyed reasons for and against COVID-19 vaccines are presented in Table 3.

Salient Black-specific considerations for vaccine confidence and accessibility include: 1) Reduced confidence in COVID-19 vaccines due to historical government inaction and racism (existing health inequities and disparities are rooted in racism; historical unethical research practices); 2) Misunderstanding of Black communities' vaccine concerns ("vaccine hesitancy" as an inaccurate label to describe vaccine skepticism; ignorance to root causes of vaccine skepticism); and 3) Recognizing and

Table 2: Focus group participant demographics

	Black/ African American, N = 17
	n (%)
Age	
20-34	6 (35.3)
35-49	2 (11.8)
50-64	4 (23.5)
65+	5 (29.4)
Gender	
Female	15 (88.2)
Male	2 (11.8)
Other	0 (0.0)
Education	
Some high school	0 (0.0)
High school graduate/GED	0 (0.0)
Associate/technical degree	3 (17.7)
Bachelor degree	6 (35.3)
Graduate degree	8 (47.1)
Prefer not to answer	0 (0.0)
Number of people in household, mean (SD)	2 (1.1)
Employment status	
Full time	6 (35.3)
Part-time	4 (23.5)
Unemployed	2 (11.8)
Retired	5 (29.4)
Essential worker[a]	8 (47.1)
Resides within a low-income zip code[b]	11 (64.7)
Very important or important for all people in community to receive the COVID-19 vaccine	7 (41.2)
Very likely or moderately likely to get an approved COVID-19 vaccine when available	4 (23.5)
COVID history	
Prior history of COVID-19 infection or symptoms consistent with COVID-19	1 (5.9)
No	16 (94.1)
Unsure	1 (5.9)

a. Essential workers included health care, janitorial services, transportation, grocery store employee, etc.
b. Median household income <$40K, per US Census 2010

building on resources in the Black community (community agency to address COVID-19 vaccine needs adequately).

Reduced Confidence in COVID-19 Vaccines Due to Historical Government Inaction and Racism

Existing Health Inequities and Disparities Are Rooted in Racism

Historical inaction from the government and public institutions to address Black health inequities affected participants' confidence in COVID-19 vaccines. Participants described inaction for social and health determinants, including chronic disease, environmental pollution, and racism. One participant expressed,

> "The US government has never been 100 percent pro-Black, right? So, now we're supposed to take a vaccine and think that we are getting some sort of, like, equity or preferential treatment because we're Black. But you don't see the government taking really harmful ingredients out of foods. You don't see the US government finding sustainable and equitable and effective programs to actually stop things like intergenerational obesity and diabetes, right?"

Participants acknowledged the government's preliminary efforts in

Table 3. Focus group participant survey, reasons for and against obtaining vaccination

	Black/African American, N = 17
	n (%)
Top reasons for obtaining a COVID-19 vaccine (participants were asked to check all that apply)	
I want to keep my family safe	8 (47.1)
I want to keep my community safe	7 (41.2)
I want to keep myself safe	7 (41.2)
I want to feel safe around other people	6 (35.3)
I believe life won't go back to normal until most people get a COVID-19 vaccine	6 (35.3)
I don't want to get really sick from COVID-19	6 (35.3)
I have a chronic health problem, like asthma or diabetes	1 (5.9)
My doctor told me to get a COVID-19 vaccine	1 (5.9)
Other	5 (29.4)
N/A	2 (11.8)
Top reasons for not obtaining a COVID-19 vaccine (participants were asked to check all that apply)	
I'm concerned about side effects from the vaccine	12 (70.6)
I don't know enough about how well a COVID-19 vaccine works	15 (88.2)
I don't trust that the vaccine will be safe	9 (52.9)
Other	5 (29.4)
I don't want to pay for it	0 (0.0)
I don't think vaccines work very well	2 (7.1)
I'm not concerned about getting really sick from COVID-19	3 (17.7)
I don't believe the COVID-19 pandemic is as bad as some people say it is	2 (11.8)
I'm allergic to vaccines.	0 (0.0)
I don't like needles	0 (0.0)
N/A	0 (0.0)

promoting COVID-19 vaccination in the Black community to counteract early reports of low vaccine uptake. However, many reported skepticism because "our country has caused us to become so skeptical that it's hard to just relax in something that may be of service for us and to us." This skepticism also stemmed from the Black community initially feeling unheard about the impact of the pandemic on their health and previous experiences in medical institutions. One participant indicated:

> "And then just the quickness with which this came about and the politics around Trump and this whole warp speed thing,… and Black people not really being taken seriously at first when it came to how we were being affected by COVID and just a general 'un-comfort-ability' with our service in the medical space."

Historical Unethical Research Practices

Unethical research practices disproportionately affected the Black community and contributed to reduced confidence in COVID-19 vaccines. Many participants expressed fears that the Black community were being used to enroll in COVID-19 vaccine trials as a form of experimentation, referencing the Tuskegee Syphilis Experiment as a basis for concerns. As one participant explained,

> "I've heard rumors of them rolling it out to the Black community as a priority because the rationale is that we are having the most affected by the pandemic and COVID. And so, hearing that just somewhat sounds like a setup. We don't want to be another Tuskegee Experiment."

Misunderstanding of Black Communities' Vaccine Concerns

"Vaccine Hesitancy" As an Inaccurate Label to Describe Vaccine Skepticism

Participants felt the Black community was being unfairly portrayed in the media as "vaccine-hesitant" compared to other racial or ethnic groups, even when members of those

groups also reported skepticism about COVID-19 vaccines. For example, participants contrasted the way the media portrayed Black Americans compared to poor White Americans:

> "The focus seems to be on us [as Blacks], and it's almost as though they know that we're skeptical as a people, and so the focus is on to break that, to break down our skepticism by the way that we're being in the spotlight and talked about as an endangered species of humans. When at the same time, what has caused us to be in that category is mostly our financial and educational limitations. But there's a huge population of poor White people, and there is not the conversation equal to, or even about them, that I'm hearing."

This overemphasis on Black "hesitancy" about vaccines created unease about stereotyping and stigmatization. As one participant described:

> "I feel like there's this oversized spotlight on Black people not taking the COVID [vaccine]. When you ask most Americans, no matter what your race is, most people are skeptical. But for some reason, there's this huge spotlight on why Black people will or won't take the vaccine… it just makes me wonder why and is it trying to pressure us in some ways to take it, to feel like we're going to be left out if we don't take it [sic]. Why isn't there that same spotlight on the entirety of our population?"

Ignorance to Root Causes of Vaccine Skepticism

Participants voiced the Black community's "hesitancy" about COVID-19 vaccines misinterpreted a more complex situation and felt governments, policymakers, and health entities did not acknowledge the historical and current events causing distrust and skepticism in Black communities. They also expressed concern about inaction by local and national leaders and policymakers, leading to medical and governmental distrust. They further endorsed the need to prioritize and address root causes of mistrust to promote confidence in COVID-19 vaccines in the Black community:

> "I think focusing on the hesitancy in the Black community, it's really important to invest as much time on the front end as much as you would on the back end. I'm not sure there's been as much of a deep dive on the reasons why that hesitancy is there for the Black community. Just an acknowledgment and knowing about Tuskegee, knowing about other things that have happened, and I feel like nothing has really been done to rectify that. It's just a constant, 'No, but trust us. Trust us'."

Recognizing and Building on Resources in the Black Community

Community Agency to Address COVID-19 Vaccine Needs Adequately

Participants expressed they could not wait for the government to overcome COVID-19 inequities; instead, they felt it would take self-determination as a community to address COVID-19 education, transportation, and vaccine registration. Participants voiced, "It's us, it's our people; it's us uniters. We've got to figure this out for ourselves." A participant also expressed:

> "We need to unite and understand how we're going to get our people treated. And if we follow those tracks, if we do those things together—[like] last year,… with Black Lives Matter, we need to do the same thing with this… because nobody's going to do it for us."

Participants also emphasized a need for a community effort to implement strategies to address vaccine access inequities within the Black community. Participants voiced distrust in the government to address vaccine inequities, reducing confidence in COVID-19 vaccines. One participant emphasized the importance of community organizing:

> "When it comes to, like, elections and voting, that they'll get the caravans of people to come and take people and what not. So, I do think stuff happening at a community level to get it out to the right people [is important]. The biggest way to do it; have it be organized. And that's been the biggest fault of our government and local government and federal… it's just been disorganized, you know,

> from this is open, this is not open, all that stuff and that causes people to have distrust. If you're not organized, then why would I trust you with my life and my health?"

Focus group participants worried about inequitable vaccine access among their communities and expressed a need for tailored public health strategies. Vaccine access inequities included limited access to up-to-date and reliable vaccine information to combat vaccine misinformation, poor access to transportation to vaccination sites, poor access for the homeless and people with disabilities to those sites, and access problems arising from time constraints for those working multiple jobs. Many participants felt Black communities rely on trusted community leaders and intergenerational assistance from relatives to overcome barriers to COVID-19 vaccine access and inequities. A participant stated:

> "They couldn't get on the line, they couldn't spend hours on the phone. So we had to work with them and their families to be online making the appointments for them… We have to step up and do those things and help each other out."

Discussion

This qualitative study of Black Americans in Los Angeles County identified factors influencing COVID-19 vaccine acceptability within Black communities. COVID-19 vaccine decision-making factors include how historical distrust of, and mistreatment by, the government and other public entities affect trust in vaccination. Participants described historical inaction for solving Black health inequities, feeling stigmatized and misunderstood about COVID-19 vaccine skepticism, and a need for tailored community outreach and self-advocacy to overcome vaccine access barriers. As public health and governmental entities seek to promote trust in COVID-19 vaccination among Black Americans, particularly when trust has not been previously established—or even been neglected and damaged— further outreach, engagement, resources, and community partnership is needed.

Social injustice, racism, and mistreatment are factors in the decision-making process for COVID-19 vaccines among Black residents in Los Angeles County. Vaccine refusal among Black Americans with other vaccines, such as influenza and human papillomavirus, has been attributed to concerns about vaccine safety and efficacy, negative vaccine messages in the media, historical medical abuses, and a general distrust in the motives of the government, health care systems, federal public health agencies, and pharmaceutical companies.[27,28] In the context of COVID-19 vaccines, quickly developing a new vaccine and simultaneously learning about COVID-19 and vaccines in real-time may play an additional role in reduced trust.[13,17]

Our findings build on previous COVID-19 qualitative studies with Black communities on mistrust of COVID-19 vaccines due to historical racism and discrimination, past medical abuses (eg, Tuskegee Syphilis study), and structural barriers contributing to vaccine access inequities.[6,13,29] Our study highlights how historical government inaction to address disparities affect vaccine confidence and community resiliency. As a result, Black communities feel they have to be self-reliant to receive equal COVID-19 information, vaccination, testing, and recovery resources. Additionally, the COVID-19 pandemic shed light on health inequities caused by structural racism disproportionately affecting Black Americans' health and well-being.[30,31] Participants felt health disparities were unaddressed during the pandemic and remain unaddressed. As structural racism continues to cause inequities in treatment, education, employment, housing, and other community and health-related resources in Black communities, justifiable skepticism among Black Americans about COVID-19 vaccines will persist.[30,32]

Our study highlights how historical government inaction to address disparities affect vaccine confidence and community resiliency.

The term "vaccine hesitancy" is controversial because it does not take

into account the role that historical and contemporary structural factors play in vaccine decision-making and acceptance among marginalized communities.[32] Study participants felt Black Americans are mislabeled as "vaccine-hesitant," because the term indicates a lack of understanding of previous experiences in medicine and with governmental entities and resulted in the community being "blamed" for low vaccination rates. While the media scapegoated Black communities for low vaccination rates, there was inequitable vaccine access in marginalized communities.[32] For example, participants expressed having limited access to the Internet and the technology needed to schedule vaccine appointments, a complex vaccine registration process, remote vaccine sites, and transportation barriers. Access barriers are embedded in a history of structural racism and segregation directed at Black communities and continue exacerbating inequitable vaccine access.[30,32]

Participants expressed a need for proactive community-based agency in COVID-19 response, recovery, and vaccination, citing how they could not rely on the government to rapidly overcome anticipated vaccine access barriers. The identified need for the community-based agency reflects how, although public health and health system institutions are publicly funded, programs and policies in these institutions may not lead to equal health outcomes or resources in Black communities. Additionally, this highlights how contemporary failures in community health and safety are seen as governmental apathy toward meeting community needs to address health disparities and inequities.[8,31] Instead, participants recognized the power of a community-led response to address Black communities' COVID-19 response needs, including localized, tailored outreach steered by trusted community members. The need for community-led activism was emphasized by leaders of the Civil Rights Movement in the 1950s. Self-empowerment and community outreach were necessary to address inequitable access to health, education, employment, and housing in Black communities.[33] Eventually, California implemented efforts to improve vaccine access and address inequities, such as partnering with and providing financial support to local community organizations, providing free transportation to vaccination sites, implementing door-to-door canvassing to reach residents in hard-to-reach communities, and utilizing mobile vaccine clinics.[34]

Public Health Implications

To reconcile trust and enhance confidence in COVID-19 vaccination, public health leaders must look beyond the impact of the COVID-19 pandemic in Black communities and address Black health disparities and inequities in general. An initial step is recognizing the historical context of Black communities' skepticism of the public health response to the COVID-19 pandemic within their communities. Public health leaders must also address the structural racism contributing to the distrusting relationship between the government, medical community, and Black communities.[32] Potential public health strategies to redress trustworthiness in Black communities include:

1. Improve understanding of underlying disparities and inequities affecting Black communities, including their COVID-19 vaccine concerns, preferences, and priorities for vaccine resources in their communities.
2. Build effective, transparent bidirectional communication strategies with Black communities. Strategies may include having public health and government leaders attend local town halls or community meetings to discuss and learn about COVID-19 needs to inform equitable outreach and tailor lay health information.
3. Support local Black public health and community partnerships with funding and resources to design and implement sustainable, community-led solutions addressing COVID-19 resources, information, and vaccine inequities, including pandemic recovery.
4. Establish partnerships with healthcare systems, public health organizations, and trusted Black community leaders (eg, Black health professionals, faith-based leaders, barbers, and local community centers) to support local capacity building for sustainable reduction of vaccine inequities.

Study Limitations

This study has several limitations. First, the focus groups contained a small sample of Black individuals from one US county. Thus, the study findings may not be generalizable to Black adults living in other locations and are not representative of views and concerns about COVID-19 vaccines among all Black communities. Second, our sample mainly contained female and highly-educated partici-

pants; thus, study findings may differ among male participants and those with lower levels of education. Third, using a virtual platform for the focus groups likely contributed to selection bias, excluding those without internet or smartphone access. Lastly, the focus groups were conducted before widespread COVID-19 vaccine distribution (vaccination eligibility at the time of this study was for medical professionals only). Messaging and information surrounding COVID-19 and the vaccines were rapidly changing and may have influenced participants' beliefs, attitudes, and concerns about COVID-19 vaccines. However, in real-time, study findings provided insight into the Black communities' perspectives on, concerns about, and perceived barriers to COVID-19 vaccination.

Conclusion

Confidence in COVID-19 vaccines within Black communities is influenced by a legacy of historical and contemporary distrust and mistreatment in the government to address health disparities and inequities, a mislabeling and misunderstanding of vaccine skepticism, and community efforts to overcome vaccine inequities. Increasing and sustaining COVID-19 vaccine confidence will require acknowledging how historical and existing structural racism impacts trust between Black communities, government, and public health entities and requires direct action from public entities to establish trustworthiness. Future public health efforts should leverage the trust and strength of influential community leaders and invest in community capacity building to develop sustainable programs addressing COVID-19 vaccine disparities and health inequities in Black communities.

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Conflict of Interest

Carson, Castellon-Lopez, Casillas, Morris, Ntekume, Brown,: received grants from the National Heart, Lung, and Blood Institute, the National Center for Advancing Translational Science, and the UCLA Oversight COVID-19 Research Committee during the conduct of the study.

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Author Contributions

Research concept and design: Mansfield, Carson, Castellon-Lopez, Casillas, Brown; Acquisition of data: Mansfield, Carson, Castellon-Lopez, Casillas, Morris, Ntekume, Barron, Norris, Brown; Data analysis and interpretation: Mansfield, Carson, Castellon-Lopez, Casillas, Brown; Manuscript draft: Mansfield, Carson, Castellon-Lopez, Casillas, Morris, Ntekume, Barron, Norris, Brown; Statistical expertise: Mansfield, Carson, Castellon-Lopez; Acquisition of funding: Carson, Casillas, Morris, Ntekume, Norris, Brown; Administrative: Castellon-Lopez, Barron; Supervision: Mansfield, Castellon-Lopez, Casillas, Norris, Brown

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