2-9-2022

Trust and Coping Beliefs Contribute to Racial Disparities in COVID-19 Vaccination Intention

Nikki McClaran
Arizona State University, mcclaran@asu.edu

Nancy Rhodes
Michigan State University, rhodesn3@msu.edu

Shay Xuejing Yao
Georgia State University, shayyao@gsu.edu

Recommended Citation

McClaran, N., Rhodes, N., & Yao, S.X. (2022). Trust and coping beliefs contribute to racial disparities in COVID-19 vaccination intention. Health Communication, 37(12), 1457-1464. https://doi.org/10.1080/10410236.2022.2035944

Trust and Coping Beliefs Contribute to Racial Disparities in COVID-19 Vaccination Intention

Nikki McClaran[1], Nancy Rhodes[1], and Shay Xuejing Yao[2]
[1] Department of Advertising and Public Relations, Michigan State University
[2] Department of Communication, Michigan State University

Author Note

Nikki McClaran, https://orcid.org/0000-0001-7335-385X
Nancy Rhodes, https://orcid.org/0000-0002-2539-9682
Shay Xuejing Yao, https://orcid.org/0000-0003-2664-7462

This is a pre-copyedited, author-produced version of an article accepted for publication at Health Communication. *The accepted manuscript is the final draft author manuscript, as accepted for publication, including modifications based on referees' suggestions, before it has undergone copyediting, typesetting and proof correction. This is sometimes referred to as the post-print version. The version of record,*

McClaran, N., Rhodes, N., & Yao, S.X. (2022). Trust and coping beliefs contribute to racial disparities in COVID-19 vaccination intention. *Health Communication, 37*(12), 1457-1464. https://doi.org/10.1080/10410236.2022.2035944

Correspondence concerning this article should be addressed to Nikki McClaran, Walter Cronkite School of Journalism and Mass Communication, Arizona State University, Phoenix, AZ. Contact: mcclaran@asu.edu

Abstract

Racial disparities in intention to obtain the COVID-19 vaccination have been noted in academic and popular press reports. The present study sought to identify cognitive and affective factors that contribute to the observed lack of acceptance of COVID-19 vaccination, even before a vaccine was made publicly available, among Black and White Americans through a national survey (N = 487; 50.6% female, 24.8% Black). Our findings are consistent with previous studies that Black respondents had lower intention to obtain the eventual COVID-19 vaccine than White respondents. Protection motivation theory's construct of coping efficacy and an additional COVID-19-relevant variable, trust in vaccination, mediated the effect of race on behavioral intention. Lastly, beliefs were elicited from Black and White Americans to identify communication strategies regarding the issue.

Keywords: COVID-19; racial disparities, protection motivation theory, belief elicitation

Trust and Coping Beliefs Contribute to Racial Disparities in COVID-19 Vaccination Intention

COVID-19 vaccine uptake has shown a disparity between racial groups, much like other types of vaccines (Lu et al., 2015). To date and across all U.S. states, Black (vs. White) individuals are disproportionality affected by COVID-19, such as by being three times more likely to contract COVID-19 (National Urban League, 2020) and having more than double the hospitalization and mortality rates (Centers for Disease Control and Prevention [CDC], 2021). Black adults are also disproportionally vaccinated for COVID-19, receiving fewer vaccine doses than is expected compared to the number of positive cases in the Black population and compared to the total population (Ndugga et al., 2021). The observed inequities are likely due, in part, to structural factors such as access to medical treatment, yet understanding the cognitive and affective factors influencing vaccination decision-making is also important (Egede & Walker, 2020). The present work investigated differences between Black and White adults in their intention to obtain a future COVID-19 vaccine. Situated within protection motivation theory (Rogers, 1975), we tested whether threat and coping appraisals mediate the relationship between racial identity and vaccine intention. Furthermore, drawing from previous vaccine hesitancy literature (Dubé et al., 2013), we tested the role of trust in vaccination and COVID-19 fear. Lastly, we used a belief elicitation process to identify potential messaging strategies (Fishbein & Yzer, 2003) to increase vaccination uptake.

Individual Predictors of COVID-19 Vaccination Intentions

Recent calls have been made to increase vaccination uptake among Black adults (Millett et al., 2020), a behavior necessary to maintain movement out of the pandemic due to their greater observed vaccine hesitancy compared to others (Woko et al., 2020). In line with research from

past pandemics (e.g., H1N1; Bish et al., 2011) and the currently emerging studies regarding COVID-19 (Bashirian et al., 2020), we used protection motivation theory (PMT) to guide our thinking about important cognitive determinants of vaccination intention.

Protection motivation theory (Floyd et al., 2000; Rogers, 1975) posits that health-protective behaviors are motivated by two types of appraisals (threat and coping). Threat appraisal involves the process of assessing the severity of the health concern and the perceived susceptibility, or vulnerability, one has to it. Coping appraisal is based upon two forms of efficacy: self-efficacy, defined as one's perceived ability to carry out the behavior (getting the COVID-19 vaccine), and response-efficacy, or the perceived ability of the behavior to defeat or manage the threat (the COVID-19 vaccine will effectively inoculate against the virus). The predictive ability of PMT has been documented for other types of vaccines (e.g., MMR vaccine; Camerini et al., 2019) and recently supported for COVID-19 vaccination intentions (Kowalski & Black, 2021; Okuhara et al., 2020). The difference between the effectiveness of threat and coping appraisals for different racial groups regarding COVID-19, however, is unknown.

In the United States, two additional variables are relevant for COVID-19 vaccination uptake and racial disparity. First, Black Americans have systemically experienced overt racism and discriminatory medical practices in a variety of contexts (Bailey et al., 2017; Egede & Walker, 2020). The long history of health and social injustice, such as the Tuskegee Syphilis study (Rogers, 2021), has made Black Americans less trustful of the health care system, which has led to more vaccination hesitancy and reduced intentions (Egede & Walker, 2020; Reiter et al., 2020). Freimuth et al. (2017), for example, found Black participants to have less trust in the general vaccine process and for the influenza (flu) vaccine compared to White participants. Regarding COVID-19, a distinct lack of trust in the medical establishment has been observed

with the COVID-19 vaccine trials as Black voices have questioned whether the vaccine is truly beneficial and safe or if they are simply serving as "guinea pigs" for the White population (Hoffman, 2020). Investigating the role of trust in vaccination, therefore, is warranted. Second, the psychological impacts of a pandemic prompt a consideration of emotional responses that may influence preventive behaviors (Ornell et al., 2020; Pakpour & Griffiths, 2020). That is, the uncertainty felt by citizens during a pandemic tends to elicit feelings of fear, which may drive behavior intention (Harper et al., 2021). Thus, in addition to trust, we consider the affective component of fear of COVID-19 to predict behavioral compliance.

The Present Research

The present research had two primary goals. First, we sought to understand the role of cognitive and emotional variables on the intention to obtain the (at the time of data collection, not yet developed) COVID-19 vaccine and the extent to which those cognitive and emotional variables mediate the effect of race on vaccination intention. We examined threat and coping appraisals, as well as trust in vaccination and fear of COVID-19. Second, we elicited beliefs about the advantages and disadvantages of a COVID-19 vaccine and examined which beliefs were related to race and vaccination intention. In addition to our focus on disparities in vaccination uptake, there are groups of White adults who are also vaccine hesitant (Fisher et al., 2020). We thought it appropriate to assess hesitancy of both populations. We therefore addressed the following hypotheses and research questions.

H1: Black participants are less likely than White participants to intend to receive a COVID-19 vaccination.

H2: Threat (H2a) and coping (H2b) appraisals positively predict COVID-19 vaccination intention.

H3: Trust in vaccination (H3a) and fear of COVID-19 (H3b) predict vaccination intention in a positive and negative direction, respectively.

RQ1: Do cognitive and affective predictors mediate the relationship between race and vaccination intention?

RQ2: What beliefs are most highly correlated with the mediators of the relationship between race and vaccination intention?

Method

Participants and Procedure

These data were taken from a larger survey of vaccination perceptions and behaviors collected between August and September 2020 using an online Qualtrics Panel. Participants were compensated according to their agreement with Qualtrics. Data collection occurred approximately two months prior to the first COVID-19 vaccination being made available in the U.S., thus all items regarding a COVID-19 vaccine represent participants' perceptions and assessments of a potential vaccine.

Quotas were established to collect data from equal distributions of White and non-White participants. For the purpose of this study, only those who identified as White or Black were analyzed. Due to low sample sizes, only non-Hispanic participants were included. After providing informed consent and being deemed eligible, participants were asked to respond to the following constructs in the order they are listed. Socio-demographic information of the final sample (N = 487) can be found in Table 1. All study procedures were approved by the university's Institutional Review Board.

Measures

***Trust in vaccination*.** Trust was measured with two items asking for one's level of trust in vaccines, in general, and for a COVID-19 vaccine once available (1 = *not at all*, 7 = c*ompletely*). The items were found to significantly correlate ($r = .60$, $p < .01$) and were averaged to create a single item ($M = 4.18$, $SD = 1.76$).

***Fear of COVID-19*.** The Fear of COVID-19 Scale (FCV-19s; Ahorsu et al., 2020) was used to assess emotional reactions to COVID-19. Participants indicated their level of agreement to seven statements such as, "I am very afraid of COVID-19" (0 = *strongly disagree*; 10 = *strongly agree*; M = 4.24, $SD = 2.74$, Cronbach's $\alpha = 0.92$).

Coping appraisal. Six items were adapted from Witte (1996) to address participants' perceived ability to get a COVID-19 vaccine, once available, and its efficacy. Example items included "I will be able to use the vaccine to prevent getting COVID-19" and "The vaccine will work in preventing COVID-19" (0 = *strongly disagree*; 10 = *strongly agree*), respectively. The items were condensed into a single item of coping appraisal ($M = 5.42$, $SD = 2.70$, Cronbach's $\alpha = 0.96$).

Threat appraisal. Participant's threat appraisal was assessed regarding COVID-19 (*COVID-19 threat*) and of potential vaccine side-effects (*vaccine threat*) (Quinn et al., 2020). The 4-item measure included susceptibility (e.g., "I'm likely to get COVID-19/COVID-19 vaccine side-effects") and severity ("I think COVID-19/COVID-19 vaccine side-effects is/are severe") items (0 = *strongly disagree*; 10 = *strongly agree*). The items were condensed into two items of threat: perceived threat of COVID-19 ($M = 5.62$, $SD = 2.52$, Cronbach's $\alpha = 0.67$) and of COVID-19 vaccine side-effects ($M = 6.03$, $SD = 2.54$, Cronbach's $\alpha = 0.77$).

Vaccination intention and behavior. Participants were asked a single item adapted from Zickfeld et al., (2020) asking, "If there was a safe and effective vaccine developed for the

COVID-19 coronavirus, how likely is it that you would choose to get this vaccine?" (1 = *extremely unlikely*, 7 = *extremely likely*; *M* = 4.66, *SD* = 2.18). Past research has found parallels between flu (seasonal influenza) and pandemic vaccinations (e.g., H1N1 vaccine; Maurer et al., 2009) and more recently, for COVID-19 vaccination intention (Dror et al., 2020; Wang et al., 2020); thus, prior vaccine behavior was assessed by asking participants whether they had received the flu vaccine in the previous year (yes/no).

***Vaccine beliefs*.** Beliefs about the advantages and disadvantages of vaccination were elicited in separate free-response fields (Fishbein & Yzer, 2003). Responses were coded by two researchers for key themes expressed. Inter-coder reliability was achieved with practice sets on 10% of the total sample, then the full dataset was coded by each researcher. Intercoder reliability was re-assessed with 10% of the final coded sample. Variables that achieved Krippendorff's α less than .70 were resolved by discussion. Themes were excluded from analysis if there were fewer than 5 observations in each racial subsample. Eight positive and six negative themes were identified (see Table 2).

Results

Predictors of COVID-19 Vaccination Intentions

Differences in gender, age, education, partisanship, past vaccination behavior, and household income were observed between the two racial groups (see Table 2) and included as covariates in the main analyses. A hierarchical regression analysis examined the predictive influence of vaccination trust, fear, threat appraisals and coping appraisals (see Table 3). The overall model was statistically significant (*Adj.* R^2 = .42, $F(12, 428) = 27.72$, $p < .001$). In Step 1, the socio-demographic and past behavior covariates explained 15.0% of the variance in COVID-19 vaccination intentions ($p < .001$). Inclusion of race in Step 2 significantly increased the

model's predictivity ($F_{change}(1, 433) = 9.30$, $p = .002$) to 16.6% variance explained. The last model (Step 3), which included the cognitive and affective predictors, significantly increased the variance to 42.2% explained ($F_{change}(5, 428) = 39.19$, $p < .001$).

Overall, Black participants were found to be less likely to get a COVID-19 vaccine, once available, than those who identified as White, supporting H1. Participants who had higher trust in vaccination, greater perceptions of efficacy regarding their own abilities and that of the vaccine, and higher perceived threat of COVID-19's effects reported greater vaccination intention. No significant effect for fear of COVID-19 or for vaccine threat appraisals was found. H2 and H3 were partially supported.

Mediation Analysis for Vaccination Intention

To assess whether the PMT and COVID-19-relevant predictors mediated the relationship between race and vaccination intentions, a parallel mediation analysis was performed using Model 4 of the PROCESS macro (Hayes, 2017; see Figure 1). Based on the prior analysis, fear of COVID-19 and vaccine threat appraisal were not examined. Trust in vaccination ($b = -.25$, $SE = .11$, 95% CI [-.48, -.06]) and coping appraisal ($b = -.13$, $SE = .07$, 95% CI [-.29, -.01]) were found to mediate the relationship between race and vaccination intentions. More specifically, Black participants were found to have less trust in vaccination and to engage in less coping appraisal toward the issue, leading to lower intentions for getting a COVID-19 vaccine, once available, answering RQ1.

Beliefs about COVID-19 Vaccination

Using the logic of Fishbein and Yzer (2003), we identified beliefs that differentially predicted vaccination intention for White and Black respondents so future efforts at message design can be more effective. Multiple regressions were performed to test whether themes

derived from the belief elicitation procedure were differentially predictive of trust and coping appraisal- the two constructs that mediated the relationship between race and COVID-19 vaccination intention. Regression equations were constructed separately for the subsamples of Black and White respondents, and for the positive and negative belief categories, with coping appraisal and trust as the outcome variables (see Table 4).

These analyses yielded differences between White and Black respondents. Black participants who mentioned positive beliefs related to vaccination as a cure had significantly stronger trust in and coping appraisal of vaccination than those that did not mention beliefs related to cure. Black participants who generated negative beliefs that vaccination was ineffective had less trust in vaccination and less coping appraisal than those who did not mention such beliefs. Among White participants, those who were unable to think of any positive beliefs related to vaccination and those who reported negative conspiracy beliefs were significantly lower in trust and coping appraisal than those who were able to generate positive beliefs or those who did not mention conspiracy beliefs. Also, for White participants, mentioning a range of positive beliefs including that vaccination would be a cure, prevent death, help in general health, and prevent illness were related to greater trust in vaccination.

Discussion

This study emphasized the importance of addressing COVID-19 racial inequities. Our findings are consistent with reports in the popular press and academic journals suggesting Black individuals to have less intentions than White individuals in obtaining a COVID-19 vaccine, even before one was made publicly available. Our work goes beyond these reports by investigating a mediation model to explain these differences in vaccine intention by race. Our finding that the effect of race on vaccine intention is mediated through trust in and coping

appraisals of the vaccine helps identify the cognitive processes that contribute to the decision of obtaining or abstaining from vaccination.

Consistent with prior work, threat appraisal, coping appraisal, and trust were all strongly related to COVID-19 vaccination intentions (Al-Rasheed, 2020; Kowalski & Black, 2021; Rad et al., 2021). We found Black Americans to have less intention to obtain a potential yet safe COVID-19 vaccine due to a lack of trust and because of a lack of coping appraisal (also understood as self- and response-efficacy). Unlike other studies (e.g., Harper et al., 2021; Yıldırım et al., 2021), the emotional component of fear regarding COVID-19 was not a significant predictor of vaccination intention in our analysis. It is important to recognize that these results are based on data collected before a vaccine was distributed to the public. However, even when considering studies that have collected data after COVID-19 vaccines were made available, the influence of fear on vaccination intentions is not clear. Some have found that those with little to no fear of COVID-19 are less inclined to obtain the vaccine (e.g., McElfish et al., 2021), whereas others have been consistent with this study's results by finding fear to not be a strong influence (e.g., Killgore et al., 2021). We therefore do not discount the influence of fear in vaccine hesitancy but rather acknowledge that more research may be needed to clarify the complexities of the relationship.

Implications for Communication

To further investigate how trust and coping appraisal matter for Black and White Americans, we elicited beliefs from our respondents. Important patterns were identified that differed for the two populations in predicting both trust and coping appraisals. Specifically, for Black participants, having salient thoughts about the health benefits of vaccinations or that the vaccination represented a cure for COVID-19 was positively related to trust in an eventual

vaccine. In contrast, having concerns that the vaccine might not be effective undermined trust. Our finding of a racial difference in vaccination intentions before the release of COVID-19 vaccines and the continued observed pattern (Ndugga et al., 2021) after vaccines have been safely distributed to millions worldwide suggests that hesitancy for COVID-19 vaccines goes beyond evidence-based factors. In other words, the hesitancy observed here is unlikely to be due solely to a lack of evidence regarding the vaccines' safety. If such was the case, we would expect to stop seeing such a strong disparity in vaccination uptake for Black Americans now that vaccines are available (Ndugga et al., 2021). Rather, it is important not only to consider the beliefs about vaccination, specific to COVID-19, but also general beliefs about medicine in the U.S. The widespread distrust of the medical system among Black Americans, including for vaccinations, is deep-rooted in the U.S. and will likely take time to combat (Bunch, 2021). A comparison of COVID-19 vaccine hesitancy and uptake in the U.S. and the United Kingdom (U.K.), for example, found a disparity for vaccine-willing Black and White participants in the U.S. but not in U.K. (Nguyen et al., 2021). This finding highlights the unique situation in U.S. regarding vaccine disparities. Campaigns should therefore be intentional about targeting the Black community with long-term messages of the vaccines' health advantages, in order to maintain trust, and to include information that may bolster people's efficacy regarding the issue. Messaging that is delivered by individuals who have a high degree of trustworthiness in the Black community would be ideal as recent research has found message source to significantly influence perceived message effectiveness of COVID-19 communication (Boynton et al., 2021). Black Americans, for example, have been found to trust health providers substantially more than federal agencies or politicians regarding COVID-19 information (Bogart et al., 2021).

It is important to note that the belief that vaccination presents a "cure" to illness may be viewed as an incorrect understanding of the issue. Great care should be taken to ensure that communication does not perpetuate a false understanding of vaccination as a cure. Communication directly or indirectly promoting incorrect beliefs about vaccination may later strengthen distrust or perceived ineffectiveness if the belief is proved false (e.g., observing someone with the vaccine not recovering or still contracting COVID-19 post-vaccine; Betsch & Sachse, 2013). Given the positive relationship found between belief of vaccination as a cure and vaccination trust and efficacy, it may be advantageous to investigate how this belief's logic could be used positively, such as that vaccination is a cure to the pandemic itself (i.e., ending the regulations), yet this strategy is only speculative and needs formal testing.

The current study found that trust in vaccination is an important contributor to racial disparities in health. Medical mistrust, a highly relevant variable for health disparity research, is the belief that healthcare providers and organizations may be actively working against one's best interests (Williamson & Bigman, 2018). Although conceptually similar, trust and mistrust are considered distinct and have been found to exhibit separate influence on health beliefs and behaviors (Pellowski et al., 2017). A Black person may, for example, have high levels of trust in vaccines and of their healthcare provider but may mistrust the healthcare system in general. The current study found specific beliefs that may bolster trust in vaccines, yet future research should consider examining the beliefs influencing medical mistrust too. It is possible that there may be different beliefs motivating mistrust of vaccines than what was found for predicting vaccine trust.

Our analysis revealed a different pattern of beliefs about vaccination for White respondents that may be of relevance. In our sample, White adults who were unable to report any

salient positive beliefs about the benefits of vaccination, and those with salient negative thoughts related to misinformation (e.g., conspiracy theories), were both less trusting and had lower coping appraisals of the vaccine. These beliefs have been strongly linked to political ideology (Tyson et al., 2020) and news consumption (Jurkowitz & Mitchell, 2020; Yao et al., 2021). Specifically, COVID-19 has become politicized as an issue with partisan news outlets publishing polarized content to their audiences (Budak et al., 2021). Heavy consumption of conservative media, for instance, has been found as a barrier to COVID-19 reduction efforts, such as by promoting misinformation (Dhanani & Franz, 2020) and by reducing vaccination intentions (Romer & Jamieson, 2020). The current study did not measure partisan media use but research testing how vaccination trust, coping appraisals, and partisan media use interact with race may add more insight into why White, unlike Black, Americans reported conspiracy beliefs as reasons to avoid vaccination.

Limitations

We recognize that COVID-19 is a developing issue that can drastically change with time. At the time of data collection, COVID-19 vaccines were not publicly available in the U.S. It is possible that with the current availability of COVID-19 vaccines, participants' beliefs and concerns may have changed. Despite this, we consider the current research relevant as the beliefs elicited from our participants successfully predicted variables long found to relate to intention to obtain other more established vaccines (Camerini et al., 2019; Quinn et al., 2017).

We also acknowledge race as a dynamic concept that is not always best treated with binary comparisons (Whitfield et al., 2008). We compared beliefs of Black and White participants so that we could better understand the belief structures that may underlie differences in vaccination uptake. Future work investigating Black and other marginalized participant belief

systems for COVID-19 and other disease states would be of value, such as by looking at the within-group variability of these populations (e.g., Black, non-Hispanic vs. Black Hispanic). Furthermore, Black Americans are not the only group of people disproportionately affected by and vaccinated for COVID-19. Those in the Hispanic/LatinX and Indigenous communities are also lagging in vaccination uptake and share similar histories of medical discrimination and inequities that must be addressed to improve vaccine acceptance (Dottle & Tartar, 2021; Sanchez & Foxworth, 2021). For health care to become more equitable, the longstanding disadvantages and injustices experienced by all marginalized groups must be addressed (Williams & Rucker, 2000).

Conclusion

The present research demonstrated that racial disparities in intention to obtain a COVID-19 vaccine are due in part to differences in White and Black American's coping appraisals and in how much they trust the vaccine. By examining the beliefs that underlie these perceptions, we believe more effective communications could be developed that would make salient the beliefs that are more likely to lead to decisions to vaccinate. Specifically, bolstering the effectiveness of vaccination may strengthen trust and efficacy, which in turn may increase vaccination intention. Due to the false perceptions of vaccination we observed, such as that vaccines present a cure or are intentionally harmful, communication campaigns should pay particular attention to refuting or abstaining from vaccination misinformation.

Declaration of interest statement: We have no known conflict of interest to disclose.

References

Ahorsu, D. K., Lin, C.-Y., Imani, V., Saffari, M., Griffiths, M. D., & Pakpour, A. H. (2020). The fear of COVID-19 scale: Development and initial validation. *International Journal of Mental Health and Addiction*. Advance online publication. https://doi.org/10.1007%2Fs11469-020-00270-8

Al-Rasheed, M. (2020). Protective behavior against COVID-19 among the public in Kuwait: An examination of the protection motivation theory, trust in government, and sociodemographic factors. *Social Work in Public Health*, *35*(7), 546-556. https://doi.org/10.1080/19371918.2020.1806171

Bailey, Z. D., Krieger, N., Agénor, M., Graves, J., Linos, N., & Bassett, M. T. (2017). Structural racism and health inequities in the USA: Evidence and interventions. *The Lancet*, *389*(10077), 1453-1463. https://doi.org/10.1016/S0140-6736(17)30569-X

Bashirian, S., Jenabi, E., Khazaei, S., Barati, M., Karimi-Shahanjarini, A., Zareian, S., Rezapur-Shahkolai, F., & Moeini, B. (2020). Factors associated with preventive behaviours of COVID-19 among hospital staff in Iran in 2020: An application of the protection motivation theory. *Journal of Hospital Infection, 105*(3), 430-433. https://doi.org/10.1016/j.jhin.2020.04.035

Betsch, C., & Sachse, K. (2013). Debunking vaccination myths: Strong risk negations can increase perceived vaccination risks. *Health Psychology*, *32*(2), 146-155. https://doi.org/10.1037/a0027387

Bish, A., Yardley, L., Nicoll, A., & Michie, S. (2011). Factors associated with uptake of vaccination against pandemic influenza: A systematic review. *Vaccine, 29*(38), 6472-6484. https://doi.org/10.1016/j.vaccine.2011.06.107

Bogart, L. M., Dong, L., Gandhi, P., Ryan, S., Smith, T. L., Klein, D. J., Fuller, L. A., & Ojikutu, B. O. (2021). *What contributes to COVID-19 vaccine hesitancy in Black communities, and how can it be addressed?* RAND Corporation. https://www.rand.org/content/dam/rand/pubs/research_reports/RRA1100/RRA1110-1/RAND_RRA1110-1.pdf

Boynton, M. H., O'Hara, R. E., Tennen, H., & Lee, J. G. L. (2021). The impact of public health organization and political figure message sources on reactions to coronavirus prevention messages. *American Journal of Preventive Medicine*, *60*(1), 136-138. https://doi.org/10.1016/j.amepre.2020.08.001

Budak, C., Muddiman, A., & Stroud, N. (2021, February 3). How did U.S. television news networks cover the pandemic? Here's a scorecard. *The Washington Post.* https://www.washingtonpost.com/politics/2021/02/03/how-did-different-us-television-news-networks-cover-pandemic-heres-scorecard/

Bunch, L. (2021). A tale of two crises: Addressing Covid-19 vaccine hesitancy as promoting racial justice. *HEC Forum, 33*, 143-154. https://doi.org/10.1007/s10730-021-09440-0

Camerini, A.- L., Diviani, N., Fadda, M., & Schulz, P. J. (2019). Using protection motivation theory to predict intention to adhere to official MMR vaccination recommendations in Switzerland. *SSM-Population Health, 7*, Article 100321. https://doi.org/10.1016/j.ssmph.2018.11.005

Centers for Disease Control and Prevention. (2021, March 21). *Risk for COVID-19 infection, hospitalization, and death by race/ethnicity*. https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html

Dhanani, L. Y., & Franz, B. (2020). The role of news consumption and trust in public health leadership in shaping COVID-19 knowledge and prejudice. *Frontiers in Psychology, 11*. https://doi.org/10.3389/fpsyg.2020.560828

Dottle, R., & Tartar, A. (2021). *Half of U.S. states have big racial gaps heading into Omicron.* Bloomberg. https://www.bloomberg.com/graphics/covid-vaccine-tracker-global-distribution/us-vaccine-demographics.html

Dror, A. A., Eisenbach, N., Taiber, S., Morozov, N. G., Mizrachi, M., Zigron, A., Srouji, S., & Sela, E. (2020). Vaccine hesitancy: The next challenge in the fight against COVID-19. *European Journal of Epidemiology*, *35*, 775-779. https://doi.org/10.1007/s10654-020-00671-y

Dubé, E., Laberge, C., Guay, M., Bramadat, P., Roy, R., & Bettinger, J. A. (2013). Vaccine hesitancy: An overview. *Human Vaccines & Immunotherapeutics*, *9*(8), 1763-1773. https://doi.org/10.4161/hv.24657

Egede, L. E., & Walker, R. J. (2020). Structural racism, social risk factors, and Covid-19- A dangerous convergence for Black Americans. *The New England Journal of Medicine, 383*(e77). https://doi.org/10.1056/NEJMp2023616

Fishbein, M., & Yzer, M. C. (2003). Using theory to design effective health behavior interventions. *Communication Theory*, *13*(2), 164-183. https://doi.org/10.1111/j.1468-2885.2003.tb00287.x

Fisher, K. A., Bloomstone, S. J., Walder, J., Crawford, S., Fouayzi, H., & Mazor, K. M. (2020). Attitudes toward a potential SARS-CoV-2 vaccine: A survey of U.S. adults. *Annals of Internal Medicine*, *173*(12), 964-973. https://doi.org/10.7326/M20-3569

Floyd, D. L., Prentice-Dunn, S., & Rogers, R. W. (2000). A meta-analysis of research on protection motivation theory. *Journal of Applied Social Psychology, 30*(2), 407-429. https://doi.org/10.1111/j.1559-1816.2000.tb02323.x

Freimuth, V. S., Jamison, A. M., An, J., Hancock, G. R., & Quinn, S. C. (2017). Determinants of trust in the flu vaccine for African Americans and Whites. *Social Science & Medicine, 193,* 70-79. https://doi.org/10.1016/j.socscimed.2017.10.001

Harper, C. A., Satchell, L. P., Fido, D., & Latzman, R. D. (2021). Functional fear predicts public health compliance in the COVID-19 pandemic. *International Journal of Mental Health and Addiction, 19,* 1875-1888. https://doi.org/10.1007/s11469-020-00281-5

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). Guilford Press.

Hoffman, J. (2020, October 7). 'I won't be used as a guinea pig for White people.' *The New York Times.* https://www.nytimes.com/2020/10/07/health/coronavirus-vaccine-trials-african-americans.html

Jurkowitz, M., & Mitchell, A. (2020, April 1). *Cable TV and COVID-19: How Americans perceive the outbreak and view media coverage differ by main news source*. Pew Research Center. https://www.pewresearch.org/journalism/2020/04/01/cable-tv-and-covid-19-how-americans-perceive-the-outbreak-and-view-media-coverage-differ-by-main-news-source/

Killgore, W. D. S., Cloonan, S. A., Taylor, E. C., & Dailey, N. S. (2021). The COVID-19 vaccine is here- Now who is willing to get it? *Vaccines, 9*(4), Article 339. https://doi.org/10.3390/vaccines9040339

Kowalski, R. M., & Black, K. J. (2021). Protection motivation and the COVID-19 virus. *Health Communication, 36*(1), 15-22. https://doi.org/10.1080/10410236.2020.1847448

Lu, P.-J., O'Halloran, A., Williams, W. W., Lindley, M. C., Farrall, S., & Bridges, C. B. (2015). Racial and ethnic disparities in vaccination coverage among adult populations in the U.S. *Vaccine, 33*(4, Suppl.), S83-S91. https://doi.org/10.1016/j.vaccine.2015.09.031

Maurer, J., Harris, K. M., Parker, A., & Lurie, N. (2009). Does receipt of seasonal influenza vaccine predict intention to receive novel HlN1 vaccine: Evidence from a nationally representative survey of U.S. adults. *Vaccine, 27*(42), 5732-5734. https://doi.org/10.1016/j.vaccine.2009.07.080

McElfish, P. A., Willis, D. E., Shah, S. K., Bryant-Moore, K., Rojo, M. O., & Selig, J. P. (2021). Sociodemographic determinants of COVID-19 vaccine hesitancy, fear of infection, and protection self-efficacy. *Journal of Primary Care & Community Health, 12, 1-7.* https://doi.org/10.1177/21501327211040746

Millett, G. A., Jones, A. T., Benkeser, D., Baral, S., Mercer, L., Beyrer, C., Honermann, B., Lankiewicz, E., Mena, L., Crowley, J. S., Sherwood, J., & Sullivan, P. S. (2020). Assessing differential impacts of COVID-19 on Black communities. *Annals of Epidemiology, 47,* 37-44. https://doi.org/10.1016/j.annepidem.2020.05.003

National Urban League. (2020). *State of Black America: Unmasked*. http://sobadev.iamempowered.com/sites/soba.iamempowered.com/files/NUL-SOBA-2020-ES-web.pdf

Ndugga, N., Hill, L., Artiga, S., & Haldar, S. (2021, December 15). *Latest data on COVID-19 vaccinations by race/ethnicity.* Kaiser Family Foundation.

https://www.kff.org/coronavirus-COVID-19/issue-brief/latest-data-on-COVID-19-vaccinations-race-ethnicity/

Nguyen, L. H., Joshi, A. D., Drew, D. A., Merino, J., Ma, W., Lo, C.-H., Kwon, S., Wang, K., Graham, M. S., Polidori, L., Menni, C., Sudre, C. H., Anyane-Yeboa, A., Astley, C. M., Warner, E. T., Hu, C. Y., Selvachandran, S., Davies, R., Nash, D., … Chan, A. T. (2021). Racial and ethnic differences in COVID-19 vaccine hesitancy and uptake. *medRxiv*. https://doi.org/10.1101/2021.02.25.21252402

Okuhara, T., Okada, H., & Kiuchi, T. (2020). Predictors of staying at home during the COVID-19 pandemic and social lockdown based on protection motivation theory: A cross-sectional study in Japan. *Healthcare*, *8*(4), Article 475. https://doi.org/10.3390/healthcare8040475

Ornell, F., Schuch, J. B., Sordi, A. O., & Kessler, F. H. P. (2020). “Pandemic fear” and COVID-19: Mental health burden and strategies. *Brazilian Journal of Psychiatry*, *42*(3), 232-235. https://doi.org/10.1590/1516-4446-2020-0008

Pakpour, A. H., & Griffiths, M. D. (2020). The fear of COVID-19 and its role in preventive behaviors. *Journal of Concurrent Disorders*, *2*(1), 58-63. http://irep.ntu.ac.uk/id/eprint/39561

Pellowski, J. A., Price, D. M., Allen, A. M., Eaton, L. A., & Kalichman, S. C. (2017). The differences between medical trust and mistrust and their respective influences on medication beliefs and ART adherence among African-Americans living with HIV. *Psychology & Health*, *32*(9), 1127-1139. https://doi.org/10.1080/08870446.2017.1324969

Quinn, S. C., Jamison, A., Freimuth, V. S., An, J., Hancock, G. R., & Musa, D. (2017). Exploring racial influences on flu vaccine attitudes and behavior: Results of a national survey of White and African American adults. *Vaccine, 35*(8), 1167-1174. https://doi.org/10.1016/j.vaccine.2016.12.046

Rad, R. E., Mohseni, S., Takhti, H. K., Azad, M. H., Shahabi, N., Aghamolaei, T., & Norozian, F. (2021). Application of the protection motivation theory for predicting COVID-19 preventive behaviors in Hormozgan, Iran: A cross-sectional study. *BMC Public Health, 21,* Article 466. https://doi.org/10.1186/s12889-021-10500-w

Reiter, P. L., Pennell, M. L., & Katz, M. L. (2020). Acceptability of a COVID-19 vaccine among adults in the United States: How many people would get vaccinated? *Vaccine, 38*(42), 6500-6507. https://doi.org/10.1016/j.vaccine.2020.08.043

Rogers, K. (2021, March 30). Tuskegee isn't the only reason why some Black people are hesitant to get the coronavirus vaccine. *CNN*. https://www.cnn.com/2021/03/30/health/tuskegee-syphilis-study-vaccine-distrust-reasons-wellness/index.html

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology, 91*(1), 93-114. https://doi.org/10.1080/00223980.1975.9915803

Romer, D., & Jamieson, K. H. (2020). Conspiracy theories as barriers to controlling the spread of COVID-19 in the U.S. *Social Science & Medicine, 263,* Article 113356. https://doi.org/10.1016/j.socscimed.2020.113356

Sanchez, G. R., & Foxworth, R. (2021, July 29). Native Americans and COVID-19 vaccine hesitancy: Pathways toward increasing vaccination rates for Native communities. *Health Affairs.* https://www.healthaffairs.org/do/10.1377/hblog20210723.390196/full/

Tyson, A., Johnson, C., & Funk, C. (2020, September 17). *U.S. public now divided over whether to get COVID-19 vaccine*. Pew Research Center. https://www.pewresearch.org/science/2020/09/17/u-s-public-now-divided-over-whether-to-get-covid-19-vaccine/

Wang, J., Jing, R., Lai, X., Zhang, H., Lyu, Y., Knoll, M. D., & Fang, H. (2020). Acceptance of COVID-19 vaccination during the COVID-19 pandemic in China. *Vaccines*, *8*(3), Article 482. https://doi.org/10.3390/vaccines8030482

Whitfield, K. E., Allaire, J, C., Belue, R., & Edwards, C. L. (2008). Are comparisons the answer to understanding behavioral aspects of aging in racial and ethnic groups? *The Journals of Gerontology: Series B, 63*(5), P301-P308. https://doi.org/10.1093/geronb/63.5.P301

Williams, D. R., & Rucker, T. D. (2000). Understanding and addressing racial disparities in health care. *Health Care Financing Review*, *21*(4), 75-90. https://www.ncbi.nlm.nih.gov/pubmed/11481746

Williamson, L. D., & Bigman, C. A. (2018). A systematic review of medical mistrust measures. *Patient Education and Counseling, 101*(10), 1786-1794. https://doi.org/10.1016/j.pec.2018.05.007

Witte, K. (1996). Predicting risk behaviors: Development and validation of a diagnostic scale. *Journal of Health Communication, 1*(4), 317-342. https://doi.org/10.1080/108107396127988

Woko, C., Siegel, L., & Hornik, R. (2020). An investigation of low COVID-19 vaccination intentions among Black Americans: The role of behavioral beliefs and trust in COVID-19 information sources. *Journal of Health Communication, 25*(10), 819-826. https://doi.org/10.1080/10810730.2020.1864521

Yao, S. X., Carnahan, D., & Rhodes, N. (2021, May 27-31). *The partisan pandemic: How media choice shapes partisan differences in Covid-19 preventive measures* [Paper presentation]. International Communication Association 71st Annual Meeting.

Yıldırım, M., Geçer, E., & Akgül, Ö. (2021). The impacts of vulnerability, perceived risk, and fear on preventive behaviours against COVID-19. *Psychology, Health & Medicine*, *26*(1), 35-43. https://doi.org/10.1080/13548506.2020.1776891

Zickfeld, J. H., Schubert, T. W., Herting, A. K., Grahe, J., & Faasse, K. (2020). Correlates of health-protective behavior during the initial days of the COVID-19 outbreak in Norway. *Frontiers in Psychology*. Advance online publication. https://doi.org/10.3389/fpsyg.2020.564083

Table 1
Sample Characteristics with Chi-Square Differences

	White (%) N = 366	Black (%) N = 121	Total (%) N = 487
Female	42.9_a	65.3_b	50.6
Republican	73.1_a	10.6_b	49.8
Past vaccine behavior	54.9_a	50.4_b	53.3
Age			
18 - 33	26.5_a	59.5_b	43.9
34 - 49	30.6_a	27.0_a	29.5
50 - 65	22.1_a	8.1_b	16.8
66 - 81	14.9_a	5.4_b	9.5
81+	0.6_c	0.0_c	0.3
Education			
Less than a high school diploma	1.2_c	0.0_c	1.2
High school diploma	17.8_a	22.5_a	18.8
Some college, no degree	20.4_a	27.9_a	24.0
Trade school training	5.5_a	1.8_c	3.9
2-year degree	7.3_a	13.5_b	10.1
4-year degree	19.5_a	18.0_a	21.8
Graduate degree	27.1_a	16.2_b	20.2
Household income			
Under $25,000	17.5_a	29.7_b	20.9
$25,001 – 50,000	22.4_a	26.1_a	23.4
$51,001 – 75,000	18.7_a	18.9_a	20.3
$75,001 – 100,000	11.1_a	10.8_a	12.3
$100,001 – 125,000	11.1_a	4.5_b	8.6
$125,001 or more	19.2_a	9.9_b	24.4

Note. Chi-square analyses were performed with different subscripts indicating differences between the White and Black samples at $p < .05$. Observations with fewer than 5 cases were indicated with a “c” subscript.

Table 2
Belief Elicitation Theme Definitions, Examples, and Inter-Coder Reliability

Themes and Coding Definitions	**Examples**	**K's α**
Positive Themes		
Cure: Vaccine will provide a "cure" to the illness.	"They will cure the disease and we'll be fine"	1.00
Death prevention: Vaccination will prevent death, rather than general sickness.	"It would keep me catching the coronavirus and dying…"	1.00
Health: The general health benefits of vaccination were provided.	"Keeps the body healthy"	0.58
Management: Vaccination will help reduce the spread of COVID-19, which emphasis on the time or geographic rate of infection.	"Containing covid"	1.00
Prevention: Vaccination will prevent or circumvent the onset of the illness.	"Avoiding disease"	0.81
Protection: Vaccination will help protect one from illness.	"It will help the body and fight off bad things"	0.81
None: Participants do not think there are any positive aspects of the vaccine	"I used to think thet [sic] prevent deseases, [sic], but not anymore"	1.00
Negative Themes		
Conspiracy: Unfounded claims or incorrect beliefs about vaccines were provided.	"Vaccinations can be untrustworthy, it is made by the evils"	0.73
Ineffective: Vaccines are thought to be ineffective or unlikely to work.	"Non effective"	1.00
Novelty: Relates to the vaccine being novel or "too" new to understand or know the negative aspects.	"Too new- not enough studies done"	1.00
Side effects: Participant believes there will be general negative side effects associated with vaccination.	"Side effects"	0.83
None: Participants do not think there are any negative aspects of the vaccine.	"No disadvantages for now"	1.00

Table 3
Hierarchical Regression Testing for COVID-19 Behavioral Intention

	Model 1 b (SE)	Model 2 b (SE)	Model 3 b (SE)
Constant	4.15 (.20)***	4.17 (.20)***	4.59 (.17)***
Socio-demographic and behavioral controls			
Gender (1 = male)	.36 (.22)	.33 (.21)	-.06 (.18)
Partisanship (1 = Republican)	-.49 (.21)*	-.84 (.24)***	-.31 (.21)
Income[1]	.14 (.05)**	.13 (.05)**	.07 (.04)
Education[1]	.15 (.05)***	.15 (.05)**	.03 (.04)
Age[1]	.02 (.01)**	.01 (.04)*	.01 (.01)
Past year flu vaccine (1 = yes)	.85 (.20)***	.84 (.20)***	.17 (.17)
Race			
Race (1 = Black)		-.85 (.28)**	-.45 (.23)^{t}
Cognitive predictors[1]			
Trust in vaccination			.41 (.07)***
Fear of COVID-19			.00 (.04)
Coping appraisal			.17 (.05)***
COVID-19 threat appraisal			.12 (.04)**
Vaccine threat appraisal			-.03 (.03)
Adj R^2	.15	.17	.43

Note. Beta coefficients reflect unstandardized values and are reported with their standard errors. $^{t}p < .10$, $*p \leq .05$, $**p \leq .01$, $***p \leq .001$
[1]Due to the nature of these variables, they were treated as continuous predictors and mean-centered for analysis.

Table 4

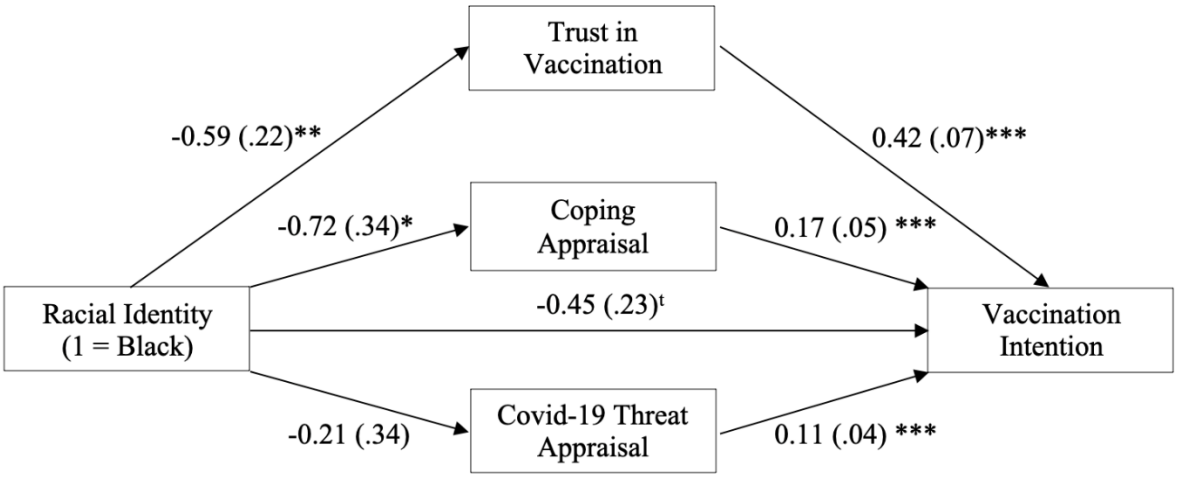
Regression of Trust and Coping Appraisal on Belief Categories for Black and White Participants

	Trust in Vaccination		**Vaccination Coping Appraisal**	
	Race of Respondent		Race of Respondent	
	Black	White	Black	White
Positive Beliefs	R^2 = .14	R^2 = .21.	R^2 = .17	R^2 = .16
Cure	.25**	.11*	.38***	.07
Death	.06	.14**	.13	.09
Health	.26**	.11*	.12	.08
Prevent	.02	.11*	.13	.03
Protect	.11	.08	.08	.05
None	-.08	-.35***	-.02	-.34***
Negative Beliefs	R2 = .07	R2 = .10	R2 = .12	R2 = .12
Conspiracy	-.07	-.21***	-.14	-.23***
Ineffective	-.22*	-.07	-.25*	-.06
Novelty	-.02	-.04	.05	-.14
Side Effects	.11	.10	.17	.07
None	.07	.18**	.12	.15**

Note. Numbers are standardized regression coefficients. *p < .05; **p < .01; ***p < .001. Categories are described in Table 1.

Figure 1

A Statical Diagram of the Parallel Multiple Mediator Model for COVID-19 Vaccination Intention



Note. All coefficients are unstandardized and the indirect effect analyses were run with 5,000 bootstrap samples. Income, education, and age were mean-centered and added as covariates, in addition to gender (1 = male), partisanship (1 = Republican), and 2019 flu vaccination behavior (1 = yes).

[t] $p < .10$; * $p < .05$; ** $p < .01$; *** $p \leq .001$